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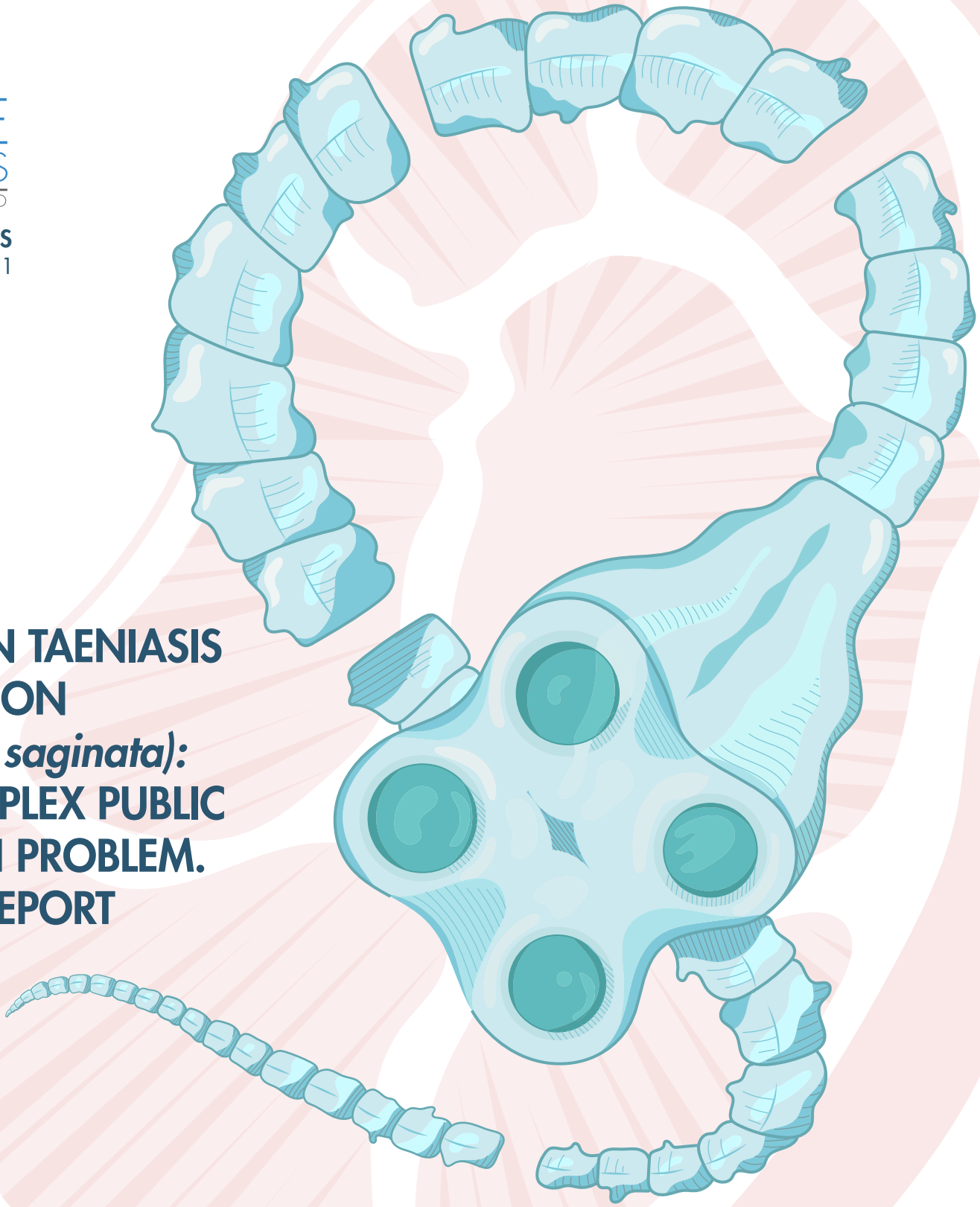

HUMAN TAENIASIS INFECTION *(Taenia saginata)*: A COMPLEX PUBLIC HEALTH PROBLEM. CASE REPORT

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PUBLIC POLICY FOR CONTROLLING THE TAENIASIS/ CYSTICERCOSIS COMPLEX IN COLOMBIA

Editorial

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The teniosis/cysticercosis (T/C) complex is a parasitic disease caused by the cestodes *Taenia solium* and *Taenia saginata*, and is considered as a neglected zoonosis by the World Health Organization (WHO) and the Colombian Ministry of Health and Social Protection. (1-3) This parasitic infection is a public health and environmental problem in Latin-American, African and Asian countries, and is currently being introduced to developed countries through immigrant communities. Estimates are that 2 500 000 people are infected with this complex and that twice as many individuals develop the parasite at the tissue level. This disease is associated to 50 000 deaths every year, but these figures need to be updated. (4-8)

The intermediate hosts of the T/C complex are cattle in the case of *T. saginata*, and pigs, dogs and humans in the case of *T. solium.* However, the adult parasite develops only in humans, in whom the tapeworm is found in the small intestine, allowing the viability of its eradication. (4,9) A meta-analysis by Ndimubanzi *et al.* (10) found that neurocysticercosis, a variant that affects the central nervous system, is associated with 29% of epilepsy cases in developing countries. (10)

This issue of Case Reports presents a clinical case of *T. saginata* tapeworm, which is of great importance since its presence continues to be demonstrated in different regions of Colombia, even though few patients attend medical consultation for this cause. This clinical presentation has few signs and symptoms, causes economic losses from infection in cattle, and is most commonly found in Europe. (9)

In Colombia, epidemiological studies have addressed the issue of *T. solium,* determining anti-synthetic antibodies and reporting prevalences in the general population ranging from 0.53% to 40% (11); in a neurological symptomatic population, the highest values have been found in Cauca (54%) (12). Moreover, neurocysticercosis cases are still being reported. (13,14)

The WHO has set the goal of ensuring a healthy life for people of all ages in developing countries by 2030, but warns that the achievement of this goal is threatened by the T/C complex, as it is transmitted, among others, through water. For this reason, it states that emphasis should be placed on aspects such as ensuring universal health coverage, with the corresponding inclusion of access to quality primary healthcare services and medication in communities living in endemic areas. Similarly, there is a need to support research activities aimed at developing vaccines, increasing funding for the health sector, strengthening early warning capacity and reducing risk factors. (3)

National and international experiences aimed at controlling and/or eliminating the T/C complex have carried out interventions using vaccines against the parasite and massive antiparasitic treatments for humans and swine, providing training on the parasitic infection, and improving pig breeding and surveillance of the parasitosis in pigs at slaughterhouses. However, future programs must have a baseline, link different sectors for interdisciplinary and institutional work and encourage the active participation of the community that is suffering the consequences of this disease (15,16).

In 2018, the Ministry of Health and Social Protection of Colombia presented the National Intersectoral Plan for the Elimination of the Teniasis/Cysticercosis Complex in Colombia 2018-2027 (*Plan Nacional Intersectorial para la eliminación del complejo Teniasis/Cisticercosis en Colombia 2018-2027*). This is a public policy that is expected to be successful and achieve the eradication of this parasitosis through active community liaison and intersectoral and interdisciplinary work with research

groups, entities related to the swine sector and municipal and departmental institutions. (3)

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HUMAN TAENIASIS INFECTION *(TAENIA SAGINATA)*: A COMPLEX PUBLIC HEALTH PROBLEM. CASE REPORT

Keywords: Taeniasis; Praziquantel; Public Health.
Palabras clave: Teniasis; Praziquantel; Salud pública.

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ABSTRACT

Introduction: Taeniasis is a zoonosis that can be found worldwide. It is relatively easy to diagnose and its treatment is currently effective. This paper describes the follow-up of a case with persistent refractory taeniasis.

Case description: A 31-year-old female patient, street-food seller, was diagnosed with taeniasis when she was 21 years old. Since she was diagnosed, multiple treatments were administered, including albendazole, secnidazole, pirantel pamoato and several metronidazole schemes, which resulted in a partial improvement of the symptoms. In 2018, she expelled a parasite of ~1 meter in length, later described as *Taenia saginata*; praziquantel was prescribed, but it is not available in Colombia. The patient was referred to the Parasitology Service, and based on her medical history and a scientific review of literature, nitazoxanide (500mg, twice a day, for 3 days) and albendazole (400mg per day, for 3 days) were administered, eliminating the infection and improving the patient's quality of life.

Discussion: This case exposes two important clinical aspects. The first is the difficulty of monitoring and treating taeniasis cases. The second is the presence of persistent refractory taeniasis cases.

Conclusion: Secondary, tertiary and combination drugs are available for effective and safe treatment of taeniasis. However, there is a need to conduct further studies to achieve better diagnosis, prevention, education and control.

RESUMEN

Introducción. La teniasis es una zoonosis global con diagnóstico simple y tratamiento efectivo. A continuación se describe el seguimiento de un caso con teniasis refractaria persistente.

Presentación del caso. Paciente femenina de 31 años de edad y vendedora de comida callejera, quien fue diagnosticada con teniasis cuando tenía 21 años. Desde su diagnóstico, recibió múltiples regímenes terapéuticos (albendazol, secnidazol, pirantel pamoato y varios esquemas de metronidazol) que permitieron una mejoría parcial de los síntomas. En 2018, la paciente expulsó un parásito de ~1m de longitud, después descrito como *Taenia saginata*, por lo que se indicó manejo con praziquantel, un medicamento no disponible en Colombia. La paciente fue referida al Servicio de Parasitología, y basados en su anamnesis y la revisión de literatura relevante, se indicó manejo con nitazoxanida (500mg, dos veces al día, por 3 días) y albendazol (400mg por día, por 3 días), con lo cual fue posible eliminar la infección.

Discusión. Este caso muestra dos aspectos clínicos importantes: la dificultad en el seguimiento y tratamiento de los casos de teniasis, y la presencia de casos de teniasis refractaria persistente.

Conclusión. Existen opciones de medicamentos secundarios, terciarios y la combinación de estos que son eficaces y seguros para tratar la teniasis. Sin embargo, es necesario hacer más estudios sobre su diagnóstico, prevención, educación y control.

INTRODUCTION

Helminths are multicellular, eukaryotic invertebrates that may have tube-like or flattened bodies. They are divided into two major groups: Nemathelmynths and Platylhelmynths. (1) The latter is subdivided into other subgroups, of which the most medically relevant is the Cestoda class with species such as: *Taenia solium, Taenia saginata, Taenia asiatica, Taenia multiceps, Hymenolepis nana, Diphyllobotrium latum* and *species of Echinococcus.* (2)

In general, human infection and disease, known as cestodiasis, is asymptomatic or has unspecific symptomatology. (2,3) However, some reported signs, symptoms and sequelae include weight loss, abdominal pain (4,5), distress secondary to observing proglottids in feces (6), expulsion of proglottids through the nose (7), decreased school performance, student dropout (8), pernicious anemia (3), gallbladder perforation (9), appendicitis (10) and bowel obstruction. (11) Moreover, the most important clinical aspect, and the greatest clinical burden, is derived from the consumption of *T. solium* eggs, which can cause the subsequent infection and aberrant encystment of the larval stage in various areas of the human body including muscles, eyes and central nervous system; the latter, especially in cases of neurocysticercosis, produces the largest associated morbidity. (12) Infections can be acquired in two general modes; the first one is secondary to the ingestion of cysts from badly prepared meat such as pork *(T. solium, T. asiatica)* or beef *(T. saginata)* (13), and the second is associated with the ingestion of *T. solium* eggs that can produce cysticercosis. (12)

Human taeniasis is one of the most important food-borne parasitic diseases, but it is preventable and treatable. (12) The Global Burden of Disease estimated that human cysticercosis by *T. solium* caused 503 000 disability-adjusted life years (DALYs) (14), although extrapolations based on these estimations suggest that they can be as high as 2.7 million. (15) On the other hand, in Colombia, the National Survey of Intestinal Parasitism found a prevalence of taeniasis of 0.08% in children (7-10 years old). (16) Additionally, estimates in intestinal parasitism indicate that more than 800 million children require treatment for these parasites. (17)

Due to its association to poverty, lack of sanitation and poor hygienic practices, prevention includes good hygiene and improvement in sanitation, health education and life conditions. (17) A recent national study, which evaluated the residual incidence of taeniasis and cysticercosis through different methods, found that 3 626 cases were reported from 2009-2013, for a national crude rate of 7.7 cases per 100 000 inhabitants: 58.2% were males, 57% were over 40 years of age, and neurocysticercosis was found in 57.6% of the reported cases. (18)

Diagnosis relies upon direct microscopy of expelled eggs or proglottids in feces. In this context, parasite-specific secretory antigens can be used for detection (Copro-Ag). (12) Treatment includes: niclosamide (2 g/person as a single dose) (19), praziquantel (5–10 mg/kg as a single dose) (20), tribendimidine (200mg <15 years or 400 mg per adult, single oral dose) (21), nitozoxanide (15 mg/kg/day for 3 days or 1.2g in a single dose) (22) and albendazole (3×400 mg/person for 3 consecutive days). (23)

This paper presents a case of persistent taeniasis in a woman who reported having received multiple therapies without success, and aggravated by the fact that the primary therapy was not available in the country.

CASE REPORT

This is the case of a 31-year-old woman, mestizo, street-food seller, with incomplete high

school studies, born and currently living in Bogotá. She reported a clinical history of 10 years of evolution, consisting of abdominal pain associated with flatulence, alteration of intestinal behavior, irritability, bruxism, weight loss and expulsion of what she described as small parasites. In August 2018, parasitological diagnosis revealed *Taenia* spp. after finding proglottids in fecal samples; proglottids were described as *T. saginata* with 12 or more branches.

Direct wet mounts and formol-ether concentration technique were performed. Following the standard routine, proglottids were washed with distilled water, fixed in 10% neutral buffered formalin, and stored at room temperature until histological processing; then uterine branches were counted under a light microscope at a magnification of 40×. Upon examination, proglottids were found and later identified as *T. saginata* (Figures 1 and 2). Proglottid morphology was of approximately 11mm in length and 8mm wide, and the received segment had around 18 uterine branches. Eggs were roughly 33 micrometers in diameter.

Figure 1. Proglottid found in the patient feces. A) Proglottid of *Taenia saginata*; B) Proglottid of *Taenia saginata.*
Source: Image obtained while conducting the study.

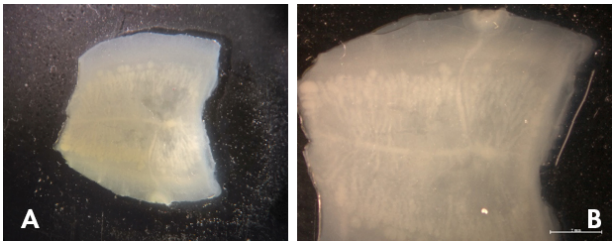

Figure 2. Proglottid found in the patient's feces.
A) Proglottid of *Taenia saginata* 1X (stereoscope);
B) Proglottid of *Taenia saginata* 2x.
Source: Image obtained while conducting the study.

Her epidemiological history included the consumption of raw beef; the patient sells food in the street which has been prepared by her for several years. Physical examination revealed generalized mucocutaneous pallor, mild pain in the mesogastrium, presence of fragmented proglottids in the anus, and signs of excoriation in the perianal area. Laboratory blood exams showed only eosinophilia.

In spite of going repeatedly to medical consultation and having received multiple antiparasitic therapies —such as albendazole, secnidazole, pyrantel palmoate and several metronidazole schemes—, the symptomatology persisted. Due to the lack of improvement, she started to have alterations in her mood. In June 2017, she consulted for expulsion of an almost complete strobila (about 1m long) without scolex, later identified as *T. saginata*; management with praziquantel was indicated, although it is not available in Colombia. Symptomatology persisted despite the expulsion of the parasite.

During the medical appointment, the treating physician reviewed the anamnesis, which revealed multiple antiparasitic schemes, made a scientific literature review and checked the national availability of medications considering that the patient continued describing the expulsion of proglottids. In August 2018, the

patient received an alternative treatment of nitazoxanide 500mg, twice a day, for 3 days in combination with albendazole 400mg per day, for 3 days. There were neither side effects nor abnormalities in laboratory parameters. After receiving this treatment, follow-up was performed at 1, 4, and 8 weeks in fecal samples to look for proglottids and to check the presence, number, and viability of *Taenia* eggs. Successful treatment was achieved because the patient expelled the worms and the eggs were not found in subsequent control stool cultures. General recommendations for hygiene and adequate cooking of meats were given.

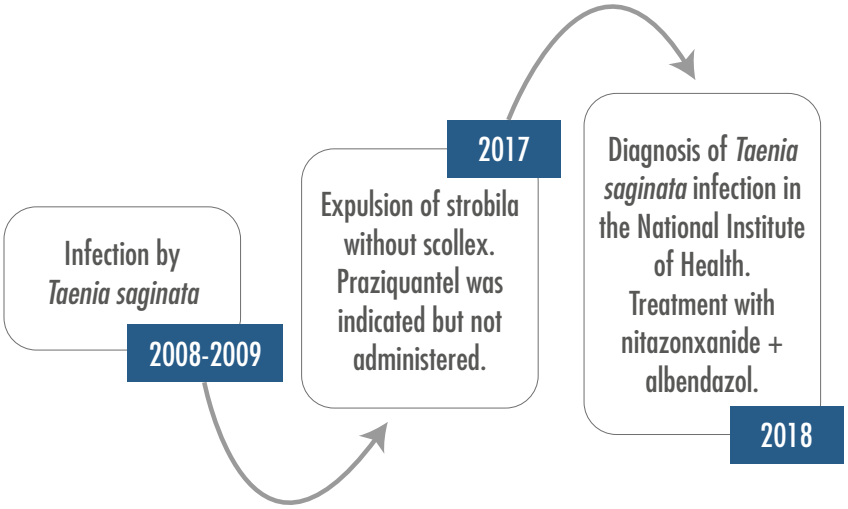

Figure 3. Timeline starting the year of possible infection, going through the diagnosis made by the National Institute of Health, and ending with the formulation of an effective and curative treatment. The patient's long clinical history is highlighted.
Source: Own elaboration.

DISCUSSION

This case report exposes two important clinical aspects. The first one is the difficulty of following and treating taeniasis in some cases. The second is the possibility of persistent or recurrent taeniasis in some people. This clinical situation can arise from two situations: 1) a possible increase in resistance to anti-parasitic drugs, and 2) the possibility of reinfection due to poor hygienic practices, which may be related to parasite species different from the one found in this patient. In this particular case, poor hygienic practices could have had dire consequences considering that the patient serves and manipulates food; this means that she could have been the node of secondary and self-limited infections, thus revealing the importance of adequate personal and food manipulation habits.

As human taeniasis is a zoonotic threat, with significant global prevalence and a large and underestimated impact on economy, agriculture and public health (24), more studies are required to estimate its real burden. Nevertheless, some epidemiological studies estimate a prevalence of taeniasis in Latin America between 0.24% and 17.25%. (12) This prevalence tends to vary according to the population and its economic, infrastructure, education, culture and hygiene

conditions, as well as to the presence of farmed pigs and livestock. (12) Therefore, environmental health, animal health and human health must be addressed simultaneously, perhaps using the One Health approach. (25) In Colombia, specifically, one of the departments with the highest seroprevalence rates is Tolima, with an estimated prevalence of 17% for porcine cysticercosis and 43.4% for human taeniasis. (26) Likewise, seroprevalences as high as 40.19% have been estimated in other departments such as Vaupés, and others as low as 0.53% in Caldas. (27) It is worth mentioning that in Colombia no department is free of porcine cysticercosis due to poor livestock practices. (26)

The majority of patients with taeniasis do not present symptoms or pathognomonic findings; occasionally, they have slight abdominal discomfort or alterations of intestinal habits, as well as peripheral eosinophilia. *T. saginata* infection may present more symptoms, compared with other species, due to its larger size and length. (28) Even as this is the case, the importance of differentiation between species lies in warning and preventing the serious complications that *T. solium* can cause, such as neurocysticercosis. (12)

Regarding antiparasitic treatment, praziquantel 5-10 mg/kg or niclosamide 2g administered as a single dose, in association with the administration of a laxative, have become the drugs of choice. (13) These two drugs have shown effectiveness of 96% and 85%, respectively (29), and seem to be the most cost-effective treatments to manage taeniasis. (12) Praziquantel is, according to the literature, a better alternative than niclosamide in terms of cost, efficacy, availability and safety. (29) The literature reports only a few cases of unsuccessful treatment of *T. saginata* with praziquantel, although they have been effectively managed with nitazoxanide (30), which has shown to be effective and have a wide spectrum of action against parasites resistant to other medications. (22,30,31) Despite of the available evidence, there are few studies in vivo, because they were approved by the FDA only until 2002. (30) Although nitazoxanide is not considered the drug of choice due to a higher prevalence of mild side effects compared to praziquantel (22,32), it is a viable alternative. (22,32) On the other hand, albendazole is also an alternative, especially with a dose of 400mg for 3 consecutive days in adults, obtaining a success rate close to 100%. (23) Unfortunately, in several countries of Central and South America, where this disease could be considered endemic (27), praziquantel and niclosamide are not available. (33)

In conclusion, this case draws attention to the great therapeutic support that is required to treat human taeniasis, as well as the alternatives for treatment when the drug of choice is not available. Other medications can be excellent alternatives for the community and the patient. However, there are still great challenges regarding prevention, education and control. The strengths of this case include the follow-up and adequate treatment of the patient, the literature search for therapeutic alternatives and the comprehensive clinical assessment of the patient. The weaknesses include the unavailability of the drug of choice and additional laboratory studies that could have contributed to better understanding this case.

CONCLUSION

This case draws attention to the difficulties in the follow-up and adequate treatment of patients with taeniasis. Furthermore it presents possible therapeutic alternatives when the drug of choice is not available. In terms of treatment solutions, multiple options of secondary, tertiary and combination drugs are available, which are effective and safe for treating taeniasis.

However, there is a need to increase diagnosis, prevention, education, control and treatment.

PATIENT'S PERSPECTIVE

The patient reports that she feels emotionally better and is hopeful that her symptoms will not recur. She says that she will follow the recommendations given to her, especially considering her work with food.

ETHICAL CONSIDERATIONS

Written informed consent was obtained for the publication of this case and the photographs obtained during the investigation.

TRANSPARENCY

The authors declare that all the information contained in this document is true, honest and transparent, that no important aspect of the case was omitted, and that every relevant characteristics or differences have been reported.

CONFLICT OF INTERESTS

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DYSMORPHIC FEATURES IN A NEWBORN WITH NEUROLOGICAL, LIVER AND KIDNEY INVOLVEMENT BY DEFECTIVE PEROXISOMAL BIOGENESIS. CASE REPORT

Keywords: Peroxisomes; Zellweger Syndrome; Newborn.
Palabras clave: Peroxisomas; Síndrome de Zellweger; Recién nacido.

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RESUMEN

Introducción. Los errores innatos del metabolismo pueden ocasionar altas tasa de morbimortalidad en el período neonatal. Dentro de estos trastornos se encuentran los desórdenes en la biogénesis del peroxisoma, que originan cuadros clínicos complejos y graves debido a que los peroxisomas están presentes en todas las células nucleadas de los mamíferos.

Presentación del caso. Paciente dismórfica recién nacida quien presentó convulsiones al nacer y desarrolló compromiso neurológico, hepático, renal y cardíaco durante sus 20 días de vida; en la necropsia se confirmó compromiso hepático y renal, por lo que se sospechó de una enfermedad peroxisomal. Las alteraciones bioquímicas reportadas en el presente caso fueron compatibles con un trastorno en la biogénesis de los peroxisomas. Como antecedente se registró la muerte neonatal de un hermano y un primo.

Discusión. La presencia de dismorfismo y convulsiones al nacer puede indicar la presencia de una enfermedad metabólica. En la paciente reportada, los hallazgos del examen físico y la demostración del compromiso hepático, renal y cardíaco se ajustan a la descripción inicial del síndrome de Zellweger; por su parte, las alteraciones bioquímicas son concluyentes de un trastorno en la biogénesis de los peroxisomas.

Conclusiones. Es necesario definir si el dismorfismo es un hallazgo aislado y si existe afectación de otros órganos o sistemas para establecer un posible diagnóstico de biogénesis de los peroxisomas. Asimismo, los errores innatos del metabolismo deben incluirse en el diagnóstico de los recién nacidos dismórficos cuando hay compromiso de varios órganos, pues su identificación posibilita la asesoría genética.

ABSTRACT

Introduction: Inborn errors of metabolism have significant morbidity and mortality rates in the neonatal period. One of these disorders is defective peroxisomal biogenesis, which causes complex and severe clinical pictures because peroxisomes are present in all nucleated cells of mammals.

Case presentation: This is the case of a newborn with dysmorphic features who had seizures at birth and presented with neurological, liver, kidney and heart involvement during her 20 days of life. Necropsy confirmed liver and kidney involvement, which, together with family history of death of a sibling and a cousin, led to suspect a peroxisomal disease that was confirmed by the biochemical alterations observed.

Discussion: Dysmorphism and seizures at birth may be an expression of a metabolic disease. The findings of the physical examination and the demonstration of liver, kidney and heart involvement are consistent with the initial description of Zellweger syndrome; the biochemical alterations are conclusive.

Conclusions: It is necessary to define if dysmorphism is an isolated finding or if there is involvement of other organ(s) or system(s) to establish a suitable diagnosis of peroxisome biogenesis. Inborn errors of metabolism should be included in the diagnosis of dysmorphic newborns when several organs are involved, since their identification enables genetic counseling.

INTRODUCTION

Peroxisomes are organelles that use molecular oxygen to remove hydrogen atoms and produce hydrogen peroxide (H_2O_2) from organic substrates; these organelles are abundant in the cells of the nervous system, liver and kidney. Catalase is an enzyme found in the peroxisomal matrix that degrades hydrogen peroxide. Peroxisomes have multiple functions in humans such as the biosynthesis of plasmalogens, phospholipids and bile acids; α and β oxidation of fatty acids; pipecolic acid and phytanic acid oxidation; purine and polyamine catabolism; among others. (1)

Peroxisomal diseases include peroxisomal biogenesis disorders (PBDs), in which deficiency of multiple functions are caused by the absence or abnormality of peroxisomes, and disorders with isolated enzyme deficiencies in which the structure of the peroxisome is preserved or slightly altered. With the exception of X-linked adrenoleukodystrophy (X-ALD), the inheritance pattern is autosomal recessive. (2)

PBDs are classified into rhizomelic chondrodysplasia punctata (RCDP) and Zellweger spectrum disorders (PBD-ZSD). The biochemical alterations of these disorders are: Zellweger syndrome (ZS), the most severe form of the Zellweger spectrum; neonatal adrenoleukodystrophy (NALD), the intermediate severity variant; and infantile Refsum disease (IRD), the mildest variant. Clinical manifestations vary according to the age of onset and severity. (2,3)

The peroxisome assembly in mammals involves protein products or peroxins from 16 PEX genes and defects have been observed in 14 of these PBDs. (4) The estimated frequency of this type of disorder in North America is 1 case per 50 000 births, but it could be higher taking into account the introduction of neonatal screening for peroxisomal diseases. (5) The measurement of very long chain fatty acids (VLCFA) in plasma is the gold standard for the diagnosis of PBD, and most patients with PBD-ZSD have alterations in 4 parameters: C26:0, C26:1, C24:0/C22:0, and C26:0/C22:0. (6,7) Molecular diagnosis is also available and is very useful given the heterogeneity of the manifestations. (8)

PBDs are not included in neonatal screening programs; however, in some U.S. states, VLCFA levels are already being measured to detect X-ALD cases, using a combination of liquid chromatography and tandem mass spectrometry with blood drops on filter paper. This has also allowed detecting other disorders with high levels of VLCFA. (3)

In the neonatal period, PBDs cause dysmorphism, feeding problems, marked hypotonia, seizures, impaired liver function and bone abnormalities (9), leading to significant mortality rates. The case of a newborn with clinical manifestations compatible with PBD is presented below.

CASE PRESENTATION

This is the case of a Caucasian female newborn from Boyacá, Colombia, who was referred to the hospital three days after her birth due to two seizures in the delivery room. She was the child of working-class parents that were not related by consanguinity and had already had a child with convulsive syndrome in the delivery room and dysmorphism who died after three days of life. Family history reports that a cousin of the baby died 3 days after his birth; it is important to clarify that the parents of this deceased child are siblings of the parents of the girl whose case is presented here (Figure 1).

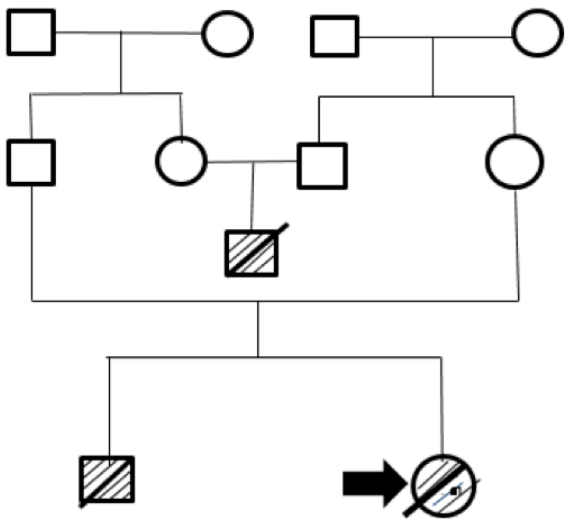

Figure 1. Family tree.
Note: the square indicates male sex and the circle, female sex. The deceased infants have a crossed line and the reported case is marked with an arrow.
Source: Own elaboration.

Physical examination on admission yielded: weight: 3 700g, height: 49cm, head circumference: 37cm, thoracic circumference: 37cm, wide fontanelle, low nasal bridge, low-set ears, orbital hypertelorism, simian crease, short neck with excess skin, bilateral corneal opacity, skin jaundice, soft tissue edema and weak pulse. The neurological examination showed hypotonia, hyporeflexia and poor response to stimuli; Moro, sucking and grasp reflexes were absent.

The baby was hospitalized in the neonatal intensive care unit, where she received intravenous fluids. Laboratory tests were taken, and blood count, urinalysis, blood glucose, electrolytes, nitrogenates and aminotransferases were normal, while total bilirubin was increased with cholestatic pattern.

A computerized axial tomography of the brain was taken six days after birth, revealing ischemic lesions in white matter and cerebral edema. The following day, the condition of the patient began to deteriorate, presenting with abdominal distension and biliary drainage through the gastric tube. A simple x-ray of the abdomen showed pneumoperitoneum that required surgery; duodenal perforation was found during the procedure. Given her clinical condition, mechanical ventilation and parenteral nutrition were indicated. Subsequently, she underwent echocardiography which showed persistence of ductus arteriosus and pulmonary hypertension. The blood culture was negative.

During her hospital stay, the patient presented anemia, thrombocytopenia, prolonged coagulation times, hypoalbuminemia, hypocalcemia, conjugated hyperbilirubinemia, normal transaminases, microscopic hematuria and discrete proteinuria, as well as arterial blood gases that showed compensated respiratory acidosis. The infant suffered an episode of fever, looked septic and developed hepatosplenomegaly. A strain of *Staphylococcus epidermidis* was isolated by blood culture and vancomycin+amikacin was prescribed. The patient received multiple transfusions of red blood cells, platelets and plasma to treat her anemia, thrombocytopenia, prolonged clotting times and hypoalbuminemia; no adverse reactions were observed.

A cranial sonography showed grade II intracranial bleeding with discrete ventricular dilatation; metabolic screening reported negative values for qualitative tests in urine: dinitrophenylhydrazine, ferric chloride, nitroprusside and nitrosonaphthol. In addition, there were traces of reducing sugars, increase in tyrosine band in thin-layer chromatographic screening of amino acids in urine, and ammonium and lactic acid levels of 477 µmoles/L and 3.2 mMol/L, respectively. The karyotype result was 46 XX.

The patient died at 20 days of age. Necropsy reported jaundice in all organs, ascites, multiple cysts in the kidneys and dilation and bile plugs in the bile ducts (biliary dysgenesis). A

peroxisomal disease was suspected due to the history of her brother, who died from a similar condition, the presence of dysmorphism along with neurological, liver and kidney involvement, and the findings of the necropsy.

Blood and urine samples were sent to the Centro de Diagnóstico de Enfermedades Moleculares (Center for the Diagnosis of Molecular Diseases) of the Universidad Autónoma de Madrid, to determine the values of pristanic, phytanic and VLCFA acids in plasma by GC/EI-SIM-MS [gas chromatography(GC)/with electron ionization (EI) in selected ion monitoring (SIM)- mass spectrometry (MS)]. This analysis found increased VLCFA C24:0 and C26:0, ratios of C24:0/C22:0 and C26:0/C22:0, and slight elevation of phytanic acid, constituting a profile compatible with PBD (Table 1). After obtaining and analyzing these results, the family was informed on the diagnosis, risk of recurrence, and lack of treatment for the disease.

Table 1. Values of pristanic, phytanic and very long chain fatty acids in plasma and quotients.

Analysis	Result	Reference values
Pristanic acid (µmol/L)	0.33	0.41±0.25
Phytanic acid (µmol/L)	6.75	3.17±2.28
C22:0 (µmol/L)	43	50±16
C24:0 (µmol/L)	83	38±14
C26:0 (µmol/L)	26.96	0.55±0.17
C24:0/C22:0	1.91	0.77±0.12
C26:0 /C22:0	0.624	0.12±0.004

Source: Own elaboration.

DISCUSSION

Seizures at birth are very rare and suggest antepartum encephalopathy. (10) However, according to the study by Pisani et al. (11), in the first 28 days of life, they have a prevalence of 2.29 cases per 1 000 live births and the main causes are asphyxia at birth, brain malformations, intraventricular bleeding, meningitis and metabolic diseases.

In the case presented here, the initial manifestations (convulsion in the delivery room, dysmorphism and neurological symptoms due to hypotonia and absence of primitive reflexes) and the family history of a deceased sibling with a similar picture led to suspect a disease of genetic origin. Considering the appearance of cholestasis in the first week of life, which is a good indicator of liver disease (12), and the subsequent development of severe liver dysfunction (prolonged coagulation times, hypoalbuminemia and hyperammonemia), the possibility of an inborn error of metabolism was considered given that metabolopathies are some of the causes. (13)

Some metabolic diseases may cause early seizures (pyridoxine-dependent epilepsy, peroxisomal diseases (10), non-ketotic hyperglycemia, mitochondrial diseases (11), sulfite oxidase deficiency (14), molybdenum cofactor deficiency (15), glutaric aciduria type I (16), among others) and dysmorphism (peroxisomal disorders, pyruvate dehydrogenase complex deficiency, cholesterol biosynthesis disorders, mevalonic aciduria, Smith-Lemli-Opitz syndrome, 3-hydroxyisobutyric aciduria, glutaric acidemia type II, D-2-hydroxiglutaric aciduria and mitochondrial disorders). (17) Peroxisomal and mitochondrial diseases present with dysmorphism and multiple organ involvement, and the latter are commonly accompanied by hyperlactatemia.

Dysmorphism and kidney (microscopic hematuria and proteinuria), heart (patent ductus arteriosus and pulmonary hypertension), liver and central nervous system involvement evidenced in the reported case pointed to a systemic disease, perhaps a peroxisomal disease resembling ZS.

The findings of this case are consistent with those presented by Zellweger (18) in a pair of siblings: hypotonia, seizures, osteotendinous areflexia, absent Moro and withdrawal reflexes, cholestatic jaundice, hypoprothrombinemia, multiple renal cortical cysts, wide forehead, low nasal bridge, wide fontanelles, low-set ears, orbital hypertelorism, simian creases, short neck with excess skin, bilateral corneal opacity, congenital heart defect and death in the first year of life.

The first step and the most widely used procedure to diagnose peroxisomal diseases is the determination of VLCFA: hexacosanic acid level (C26:0), C26:0/docosanoic acid ratio (C22/0), and tetracosanoic acid ratio (C24:0)/C22:0. VLCFA levels are elevated in PBD-ZSD and some isolated deficiencies, but they are normal in rhizomelic chondrodysplasia punctata. (6)

In this case, the determination of the VLCFA showed an increase in the levels of C24 and C26 and a discrete elevation of phytanic acid, which together with the clinical findings made it possible to diagnose PBD. A level of C26>3.34 µmol/L and a C26/C22>0.10 ratio, such as those found in the reported patient, are diagnoses of ZS according to the study by Subhashini et al. (19), performed in a cohort of 90 cases and 111 controls. In addition, the presence of tyrosiluria in urine amino acid chromatography had previously been reported by Yamaguchi et al. (20) in a cohort of 20 Japanese patients with peroxisomal diseases.

Molecular studies are used to confirm the diagnosis of metabolic diseases, to establish carrier status and genotype-phenotype relationship, and to make prenatal and preimplantation diagnosis. (21) Since the phenotypic expression of peroxisomal diseases is very heterogeneous, the molecular defect definition is useful in intermediate severity forms that may not show alterations in VLCFA. (8) The present case did not have molecular studies due to the technological and economic limitations of the Colombian health system; however, the biochemical alterations were conclusive to diagnose PBD.

Although PBD-ZS has no treatment, its management should be multidisciplinary and, given the broad phenotypic spectrum, it should aim at improving the living conditions of patients, so it seeks to reduce feeding difficulties, improve liver function with supplementation of vitamin K and bile acids, manage and control seizures, and monitor sensory deficits and adrenal and kidney functions. (3) The prognosis of this disease is bleak and may lead to neonatal mortality, as in this case; however, intermediate severity cases that reach adulthood and behave as degenerative diseases may be found.

CONCLUSIONS

When dysmorphism occurs, it is necessary to establish whether it is an isolated finding and whether other organs or systems are involved. In the reported case, this disorder was accompanied by seizures in the delivery room and neurological, liver, kidney and heart involvement, manifestations that, added to the history of a deceased sibling with similar symptoms, led to the suspicion of a systemic, metabolic and genetic disease, perhaps a peroxisomal disease that resembled ZS.

Inborn errors of metabolism should be included in the diagnosis of dysmorphic neonates, especially those with multisystemic involvement. In this sense, the judicious elaboration of the clinical history and the support of laboratory tests and imaging reports are essential to propose a possible diagnosis.

Colombia is far from having a screening program for peroxisomal diseases, since the

introduction of an expanded screening similar to that of developed countries is still under discussion. Therefore, it is highly relevant to establish a diagnosis, as in the case of this report, to be able to give advice to the family.

ETHICAL CONSIDERATIONS

The publication of this case report was approved by the coordination of the Specialty in Perinatology and Neonatology of the Universidad Nacional de Colombia, Bogotá Campus.

CONFLICTS OF INTEREST

None stated by the authors.

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NEURAL THERAPY APPROACH IN A HOSPITALIZED PATIENT WITH ACUTE STRESS DISORDER. CASE REPORT

Keywords: Stress Disorders; Traumatic, Acute; Neural Therapy; Complementary and Alternative Medicine.
Palabras clave: Trastornos de estrés traumático agudo; Medicina alternativa y complementaria; Terapia neural.

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RESUMEN

Introducción. El trastorno por estrés agudo es un cuadro de rápida instauración que se da luego de un evento traumático y se caracteriza por síntomas disociativos, intrusivos, de evitación y de activación que afectan la calidad de vida del paciente. A la fecha, no se ha evidenciado una relación causal orgánica de este trastorno y tampoco existe literatura sobre su intervención mediante terapia neural intrahospitalaria.

Presentación del caso. Paciente femenino de 53 años quien desarrolló síntomas compatibles con un trastorno por estrés agudo posterior a la resección de una masa abdominal secundaria a un linfoma. La mujer fue valorada por el servicio de medicina neuralterapéutica, que intervino con procaína en sitios específicos de la piel —determinados por anamnesis y examen físico— con posterior mejoría de los síntomas disociativos.

Discusión. El enfoque neuralterapeútico permitió, por un lado, identificar un vínculo entre los síntomas disociativos de la paciente y la alteración orgánica asociada, y, por el otro, hacer una intervención con la que se logró la resolución de tales síntomas.

Conclusiones. La medicina neuralterapéutica ofrece estrategias de intervención a nivel hospitalario que pueden ir concomitantes al tratamiento instaurado por otras profesiones en el área de la salud ya que permite tener una perspectiva integral del paciente al considerar la estrecha relación funcional entre mente, emociones y cuerpo.

ABSTRACT

Introduction: Acute stress disorder is a picture of rapid onset that follows a traumatic event. It is characterized by dissociative, intrusive, avoidance and activation symptoms that affect the quality of life of the patient. To date, there is no evidence of a relationship between altered organ function and this disorder, and there is no literature on its treatment with neural therapy on an inpatient basis.

Case presentation: 53-year-old woman, who developed symptoms compatible with acute stress disorder after the resection of an intra-abdominal mass diagnosed as lymphoma. The patient was assessed by the neural therapy department, which applied procaine into specific skin zones —determined by the clinical history and physical examination—, with improvement of dissociated symptoms.

Discussion: The neural therapy approach allowed identifying the relationship between the dissociative symptoms of the patient and the associated alteration in organ function, as well as applying a therapy that led to the resolution of the symptoms.

Conclusions: The neural therapy approach allows for a comprehensive perspective and treatment of the patient, taking into account the close functional relationship between mind-emotions-body. This type of treatment also offers therapeutic strategies to hospitals, which can accompany the treatment established by other health specialists.

INTRODUCTION

According to the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (DSM-5) (1), acute stress disorder is a fast-onset condition (3 to 30 days after a traumatic experience) characterized by dissociative, intrusive, avoidance, and arousal symptoms that significantly affect the patient's quality of life. Currently, efforts are being made to recognize the magnitude of this disorder within the hospital environment, as it may be a predisposing factor for readmissions within 30 days, development of post-traumatic stress disorder, and progressive cognitive impairment. (2)

Although acute stress disorder is related to medical conditions such as sepsis, burns, acute myocardial infarction, surgeries, among others, there is no information on a direct physiological relationship between these conditions and the dissociative symptoms found in this type of disorder. To date, literature on the neural therapy approach to these patients is not available. (3-5)

Neural Therapy Medicine (NTM), as it is called by the Colombian School of Neural Therapy, is a complex medical system characterized by a holistic perspective of the individual, based on an indissoluble relationship between mind and body within the framework of the principle of monism and its adoption in the physiological theory of nervism. The latter conceives the nervous system as the coordinator of all the physiopathological states of the body. (6,7)

NTM's clinical approach recognizes that visceral-organic involvement, mediated by the cerebral cortex, may be the cause of several acute behavioral symptoms. These findings were studied in animal and human models based on the Russian synthetic physiology strategy and were recorded by the British neurologist Henry Head at the beginning of the twentieth century during his medical practice. (8-10)

This article presents the case of a patient diagnosed with acute stress disorder treated with the neural therapy approach in the hospital environment and the course of her condition during hospitalization.

CASE PRESENTATION

Female patient, 53 years old, from Bogotá D.C. (Colombia), mestizo, housewife, of limited economic resources and with a diagnosis of early onset Parkinson's disease (since the age of 50), major depressive disorder, hypothyroidism, arterial hypertension, severe obstructive sleep apnea syndrome, coxarthrosis, dyslipidemia and obesity. The patient was taking metoprolol 50mg every 12 hours, clonidine 150mcg every 12 hours and pramipexole 1.5mg every day. Her surgical history included cholecystectomy performed at the age of 33, and hysterectomy at the age of 50; the patient reported developing depressive symptoms and motor difficulties following the latter procedure.

She had been hospitalized due to a painful mass in the lower half of the abdomen one month prior to the consultation. On that occasion, the report of contrast computed tomography (CT) of the abdomen and colonoscopy suggested cancer of the blind/ascending colon, with no biopsy report at the time of hospitalization. On January 12, 2015, she attended the Emergency Department of the Hospital de Meissen due to symptoms of nausea and abdominal pain, as well as positive findings during physical examination that showed signs of mild dehydration and globose abdomen with mass in right iliac fossa of 10x15cm, indurated and attached to deep planes, but without signs of peritoneal irritation. According to the laboratory tests taken on admission, she presented anemia (HB: 11.3) without leukocytosis (7 700); therefore, she was hospitalized for right hemicolectomy due to clinical suspicion of intestinal obstruction.

During hospital stay, the patient developed affective and anxious symptoms related to her clinical condition. She was assessed by the psychology service, which provided cognitive therapy for restructuring and elaboration of the mourning process (recent death of the father), and referred her to the psychiatry service taking into account her history of major depressive disorder. The psychiatry service considered that she was experiencing the reactivation of affective and anxious symptoms associated with her clinical condition, without the presence of dissociative symptoms or alteration in the state of consciousness or care. No medication was recommended at this point because of the risk of side effects considering her current state of health, so management with clonazepam 2.5mg was indicated only in case of insomnia.

On January 23, the patient was taken to surgery, finding extensive mass with infiltration to adjacent structures: involvement of right ureter, deep primitive iliac vessels and right hypogastrics, intestinal perforation and generalized peritonitis. Right hemicolectomy, omentectomy, resection of abdominal wall segment, and distal endermine-terminal colon-ilileus anastomosis were performed, while antibiotic management (ampicillin sulbactam) with subsequent escalation to meropenem and vancomycin was indicated due to the persistence of systemic inflammatory response syndrome (SIRS) and positive blood culture report for gram-negative and gram-positive bacteria. In addition, an oncology assessment was requested since the biopsy report prior to the current hospitalization suggested the presence of lymphoma.

After the surgery, the patient developed symptoms that suggested intestinal obstruction and persistence of SIRS, so a CT of the abdomen was ordered with double contrast limited by intolerance to the oral route. The imaging findings revealed abundant free fluid inside the abdominal cavity that required a new surgery on January 31; during the procedure, a hematoma was found in the abdominal wall without dehiscence of distal colon-ileus anastomosis.

Following the second surgery, the affective symptoms persisted and were reflected in non-adherence to non-pharmacological recommendations given by the treating service. For this reason, a new evaluation by psychiatry was requested on February 3, reporting that her behavior was a secondary reaction to multiple stressors, including conflicts with the nursing staff; further management by this specialty was not indicated.

The patient persisted in her low adherence to medical recommendations, so a new evaluation by Social work and Psychology services was requested. On February 6 they interviewed the patient and reported that she said that she did not receive adequate care from the nursing staff and had affective and anxious symptoms due to her medical condition. As treatment, emotional support was provided and work was developed on “negative disturbing cognitions versus medical condition”.

The patient continued presenting affective symptoms, as well as signs of SIRS and aggravation of anemia, requiring transfusion support. Due to the persistence of affective symptoms, on February 12, the support of the NTM service was requested, and an intervention was carried out on the same day. During the interview, the patient reported that she had feelings of anxiety, suspicion and persecution at night after the surgery, which were associated to sensations of thoracic oppression, palpitations, dyspnea and heat in the vertical region of the scalp. The physical examination showed hypersensitivity points in the anterior thorax at bilateral costochondral joints (Head’s heart area), scarce hypersensitivity points in the right iliac fossa and hypersensitivity points in the vertical and

occipital zones of the scalp (Head's liver and intestine areas, respectively).

Procaine was administered in the sites referred to as anchors of physical sensations associated with affective symptoms and located in the thoracic area and scalp, specifically, painful points in the anterior thorax from T3 to T6 and painful points in the vertical and occipital zone of the scalp. NTM's records state that the patient said that she did not have new episodes of anxiety, panic or thoracic oppression the day after the intervention, but the feeling of "heat" in her head and nausea persisted. Findings on mood swings were also reported in the general surgery evolution notes: "patient reports feeling better and having a good night," "patient says she is livelier."

On February 18, during the follow-up by NTM, the patient reported an improvement in her mood, without new episodes of nocturnal panic or thoracic oppression, but also described an increase in nausea. On physical examination, in addition to dehiscence of the distal third of the surgical wound with the presence of serohematic fluid, the patient presented areas of abdominal cutaneous hypersensitivity from T6 to T10 (upper part of the stomach and intestine area). The NTM service considered that the initial irritation involved in the anxious and adaptable symptoms was clearly related to abdominal symptoms, so procaine was administered in the identified Head areas (anterior region of dermatomas T6 to T10). No adverse events or complications were reported after the procedure.

Subsequently, her clinical picture improved, showing modulation of inflammatory response, so the general surgery service discharged her on February 21. The patient did not attend outpatient follow-up consultations with the neural therapy service at Hospital de Meissen and died at home in March as a result of systemic involvement secondary to a neoplasm. In 2018, her daughters provided informed consent for the review of the clinical history.

DISCUSSION

According to its definition, acute stress disorder is secondary to a traumatic event, but is not the direct result of an organic alteration, as is the case of acute confusional state.

In the clinical case described here it was possible to observe dissociative symptoms, negative mood, sleep disturbance and irritable behavior after the first surgery. After reviewing the clinical history and reaching a consensus, the authors considered that the symptoms were compatible with acute stress disorder characterized by negative mood and dissociative, avoidance and warning symptoms that persisted from 3 to 30 days after the traumatic event occurred, and at least nine of the symptoms were included in the categories of intrusion symptoms. (1,11)

Acute stress disorder has been identified in patients hospitalized for various causes, including infectious, traumatic, ischemic and surgical processes; however, to date, that the physiological alteration secondary to these processes is, per se, a determining factor of the disorder has not been ruled out. (3,4)

In 1901, Dr. Henry Head described some clinical cases in which previously healthy patients presented sudden behavioral changes parallel to a visceral disease. These changes included visual, auditory, and olfactory hallucinations; depression; exaltation; and suspicion. The latter, which was observed in the clinical case reported here, was described as a sudden feeling of distrust and thoughts of being judged/criticized by others, even though there was no real basis to justify these thoughts. (8) The common denominator of hospitalized patients who reported mental

symptoms was pain and skin hypersensitivity in the trunk and reflex areas on the scalp, of sudden or rapidly progressive instauration, and of considerable intensity. (8,12)

To identify mental changes secondary to visceral diseases, Dr. Head initially relied on his description of visceral dermatomas, which is described in his 1892 doctoral thesis and published in the Brain journal. He created a segmental map, without areas of overlap, which, in light of current knowledge, make evident the reflected innate connection between viscerotomes and dermatomes of the same embryological somites. The skin areas compromised by visceral alteration show hypersensitivity or increased perception at cold or warm temperatures during surface examination. (12-14)

Currently, some authors call this map algetic dermatomes, since it is based on the exploration of pain and temperature (protopathic sensibility) and does not overlap, as opposed to aesthetic or tactile dermatomas, widely described by Sherrington, which do overlap and are based on the exploration of touch and pressure (epicritic sensibility). (12,15)

All these findings demonstrate the association between mind and body in a disease process, which is compatible with the conceptual bases of NTM, including nervism, a physiological current that considers the nervous system as a governing unit of an individual's adaptation processes, among them, pathological processes known as neurodystrophies. (9,16,17) They are alterations in the tone of the nervous system that occur after being subjected to pathological irritation, either by an irritating stimulus or by the sum of stimuli that cause a permanent state of excitement mediated by the cerebral cortex, leading to a final state of inhibition or parabiosis. This final state was described by Wedensky and is observed in somatic, mental or emotional symptoms. (9,10,16-18)

The NTM identifies the relationship between physical, mental and emotional symptoms and signs that are part of a morbid process, as well as their possible initial cause by approaching the individual's uniqueness through a thorough exploration of their life history, physical examination and diagnostic aids. (19) The central axis of the NTM intervention is the application of neural therapy (local anesthetics) in specific sites in order to regulate neuron function in a process known as self-eco-organization (neologism based on Morin´s complex thought and biocybernetics). (17,20).

With respect to the clinical case reported here, it should be noted that the neural therapy assessment was requested due to the persistence of the patient's dissociative symptoms, despite the interventions carried out by the psychiatry and psychology services. The symptoms referred by the patient during consultation, their temporal relationship after surgery and the sensibility findings in dermatomas on physical examination according to Head —heart, stomach, intestines and liver— oriented the neural therapy diagnosis towards a basic visceral alteration. She also had two previous irritations caused by surgeries in the gastrointestinal area which favored the generalization of dystrophy. This resulted in the onset of dissociative behavioral symptoms that resolved with neural therapy in the corresponding skin points, thus leading to a perception of improvement in the clinical behavioral picture of the patient and the medical team during the last days of her hospital stay.

The limitations of this study include the unfeasibility of follow-up of the patient, since she died three years before beginning with this work; however, informed consent was provided by the daughters in 2018. In addition, the acute stress disorder diagnosis was not made during the patient's hospitalization period, but during the execution of the project and based on the

review of the clinical history and after the authors reached a consensus; for this reason, it was not possible to rate in-hospital follow-up scales of the disorder.

Another limitation is the scarce literature on the neural therapy approach to psychiatric disorders. To date, there are few studies that consider this type of intervention as a potential tool in adaptive emotional processes, although NTM treatments have been reported which aim at treating bulimia and anxiety disorder, with no records of cases of patients with acute stress disorder treated with this medical system. (21,22)

CONCLUSIONS

Based on the reported case, it is possible to suggest that the acute onset of behavioral disorders after visceral irritation may correspond to Henry Head's classic descriptions of the beginning of the twentieth century. These behavioral disorders could also be explained from the physiological perspective of nervism, which is based on the work of scholars such as Ivan Petrovich Pavlov.

In order to validate the observations contained in this article, it is necessary to create a line of research in the field of NTM under other methodological designs, with a higher level of evidence and a larger sample of patients.

Finally, the article raises the possibility of applying neural therapy care in the hospital environment, along with the treatment established by other health specialties and bearing in mind that, in Colombia, NTM has been limited, largely, to the private practice. However, at the intrahospital level, this could be a diagnostic and therapeutic approach to improving the patient's quality of life.

CONFLICTS OF INTEREST

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ENVENOMATION BY AN ARACHNID (*LATRODECTUS* OR *STEATODA*): CASE REPORT INVOLVING A WOMAN AND HER FEMALE DOG

Keywords: Arachnida; Spider bite; Human; Case report; Dog; *Steatoda*; *Latrodectus*.
Palabras clave: Arachnida; Mordeduras por arañas; Reporte de Caso; Humano; Canino; *Steatoda*; *Latrodectus*.

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ABSTRACT

Introduction: Accidents involving spiders bites usually cause mild medical reactions that lead to local symptoms and, less commonly, systemic effects. The most medically significant spiders belong to the genera *Latrodectus* and *Loxosceles*. This paper presents a possible case of steatodism in a young woman and her pet.

Case description: 26-year-old female patient, who reports a clinical history characterized by paresthesia, malaise, fever, diarrhea and a painful papule in the left cheek after being bitten by a spider. Immediately after being bit, the patient hit the spider with the back of her hand and it fell to the ground, where her dog swallowed it. The dog presented with vomiting and general discomfort after ingestion. Symptomatic therapy was given for comfort, and neither the patient nor the dog required antivenin therapy. Both evolved favorably.

Discussion: The relevance of this case is the involvement of two mammals (a human and her dog) due to the accidental contact with a spider, possibly of the genus *Latrodectus* or *Steatoda*.

Conclusion: Two possible cases of steatodism are described. Since spider bites are a relatively frequent reason for medical consultation in Colombia, it is important to diagnose and manage them properly.

RESUMEN

Introducción. Los accidentes producidos por arañas suelen ser eventos médicos poco severos. La mordedura provoca, por lo general, síntomas locales y, menos frecuente, efectos sistémicos. Las arañas más importantes desde el punto de vista médico pertenecen a los géneros Latrodectus y Loxosceles. Se reporta un posible caso de steatodismo en una mujer joven y su mascota.

Presentación del caso. Paciente femenino de 26 años quien presenta cuadro clínico de 5 días de evolución caracterizado por parestesia, malestar general, fiebre, diarrea y una pápula dolorosa en la mejilla izquierda después de ser mordida por una araña. La joven golpea la araña inmediatamente con el dorso de la mano y esta cae al suelo, donde su perra la ingiere; esta última presenta vómito y malestar general después de la ingesta. Como tratamiento se administró terapia sintomática y ninguna de ellas requirió antiveneno. Ambas evolucionaron favorablemente.

Discusión. Se presentan dos posibles casos de steatodismo, siendo el aspecto relevante del presente caso que tanto la paciente como su mascota presentaron síntomas debido al contacto accidental con una araña, posiblemente del género *Latrodectus* o *Steatoda*.

Conclusión. Dado que los accidentes por mordedura de araña son relativamente frecuentes para la consulta médica en Colombia, es importante diagnosticarlos y manejarlos de forma adecuada.

INTRODUCTION

Spiders have been one of the most feared groups of arthropods for centuries (1-3), still knowledge on the clinical effects of their bites is substantially scarce. (4,5) However, it is known that out of approximately 40 000 described species of spiders (6), the majority are not medically significant. (5)

While most spider bites cause mild reactions (7), some species can cause severe damage at the local and systemic levels with lasting consequences, even death. (5) The most dangerous species for humans belong to two + genera of spiders, namely *Latrodectus* spp., from the Theridiidae family (i.e. black widow), and *Loxosceles* spp., from the Sicariidae family (i.e. brown recluse); other important group includes some mygalomorphs (i.e. funnel-web spider). (5) Bites involving these genera occur worldwide and may have a wide array of clinical effects and manifestations. (5,7)

In this regard, all spider bites have a variety of signs and symptoms that can be divided into local and systemic. (5,7,8) In cases of latrodectism and steatodism, the clinical manifestations are similar (Table 1), although the latter is usually less severe. (7,9) Local manifestations include pain, pruritus, edema and erythema, whereas systemic symptoms can include abdominal or thoracic pain, nausea, diaphoresis, malaise, fever and headache. (5,7,8) Other species of spiders can cause blisters, ulcers, necrosis and more severe organ involvement (for example *Loxosceles* spp.). (5,7,8)

Table 1. Symptoms of *Latrodectus* and *Steatoda* envenomation

Latrodectism	Steatodism
Bites are generally painful	Painful bite
Erythema	Erythema
Swelling	Swelling
Isolated diaphoresis, asymmetrical regional diaphoresis, below knee diaphoresis	Isolated diaphoresis is less common
Malaise	Malaise
Muscle spasm and cramps	Muscle spasm and cramps
Increased autonomic function (tachycardia, tachypnea and hypertension)	Facial flushing
Piloerection	Piloerection
Nausea	Nausea
Headache	Headache
Central punctum	Papule
Burning sensation in the site of the bite	Pruritus
Abdominal pain	Abdominal pain
Chest pain	
Back pain	
Rhabdomyolysis	
Myocarditis	
Myalgia	
Vomit	
Priaprism	

Source: Own elaboration based on (10), (11), (12), (13), (14), (15) and (16).

The clinical similarity between these two species may lie on the fact that *Latrodectus* and *Steatoda* belong to the same family of spiders (Theridiidae) and share α-latrotoxin, which is highly divergent among the members of the family. (17) The neurotoxicity of this venom is characteristic and may cause the release of norepinephrine and acetylcholine in an exhaustive manner. (18) The secretion of these neurotransmitters seems to be secondary to calcium dependent and independent mechanisms. (19,20) Opioids and muscle relaxants administration is the most recommended therapy for latrodectism (21), whereas antivenin use should be considered only in severe envenomation cases. (21) For decades, antivenin has been considered effective for the treatment of latrodectism (22), although a recent clinical trial claims otherwise. (23) On the other hand, analgesic treatment seems to be sufficient for *Steatoda*, although *Latrodectus* antivenom could be effective in some cases. (24)

For comparison purposes, adequate treatment in cases involving another relatively common spider in the region (25), *Loxosceles*. spp., contemplates: rest, ice, compression and elevation (RICE) (26-28), although wound care and surgical intervention may be needed in severe cases (this is recommended from 6 to 8 weeks after the bite to allow tissue healing). (26) Treatment and manifestations are different considering the toxins present in this venom, including phospholipase-D, metalloproteinases and hyaluronidases, which explain the possibility of necrosis and ulcers. (29)

This article presents the case of a female patient who was bitten by a spider, and her pet, which ingested it afterwards.

CASE DESCRIPTION

26-year-old female patient, Caucasian, from a lower-middle class household, who lives in a town near Bogotá at approximately 2 600 meters above sea level, alone with two dogs. Her medical history includes kidney stones, several urinary infections, fracture of the 4th and 5th metatarsal bone in the left toes, and tympanic membrane perforation of the left ear. The patient reported that she had never undergone surgery and that she did not use recreational drugs or prescribed medications of any kind. She had a family history of diabetes (maternal grandfather), cancer (maternal grandmother, unknown type) and arthrosis (paternal grandmother).

The following is the timeline of the events:

04/05/2019 (20:45): The patient was bitten by a spider on the cheek while she was lying in bed. She immediately hit it with the back of her hand to remove it. After this action, the spider fell to the floor and one of her dogs ate it.
04/05/2019 (20:45–20:50): She developed local pain, pruritus, erythema and paresthesia immediately after the bite. The erythema had a diameter of approximately 5cm.
04/05/2019 (20:50 – 20:58): Appearance of an endured and painful papule with possible fang marks according to the patient (Figure 1).
04/05/2019-08/05/2019: No exanthema, blisters, pustules, necrosis or ulcers developed. No ocular, orbital, moderate or severe neurological involvement occurred. She referred continuous improvement of erythema, pain and pruritus. Mild reduction in the size of the papule. Disappearance of paresthesia. She developed fever (38.5°C), diarrhea without mucus or blood, malaise, asthenia, adynamia, and lower back pain. All symptoms resolved within three or four days following the bite. Regarding the dog, she referred that it showed asthenia, salivation, adynamia, vomiting and malaise (Figure 2). She denied other physical signs and symptoms in the dog such as hypothermia, muscular fasciculations, diarrhea, dyspnea, claudication or aggressiveness.

09/05/2019: Day of consultation and visit. The pain and itching were still present but they were not as severe. Lesion and erythema had decreased to 5mm. Systemic symptoms were absent. She was given antipyretics and analgesics for comfort (Ibuprofen 400mg every 6 hours). As her symptoms were mild and her clinical course was uneventful, she did not require further therapy or antivenin. There were no adverse reactions to therapy or during the course of the disease. Laboratory exams were not requested. The dog seemed to be mildly dehydrated, but it was improving rapidly. There was no evidence of a bite site; however, the patient was advised to seek veterinary help, which she did.

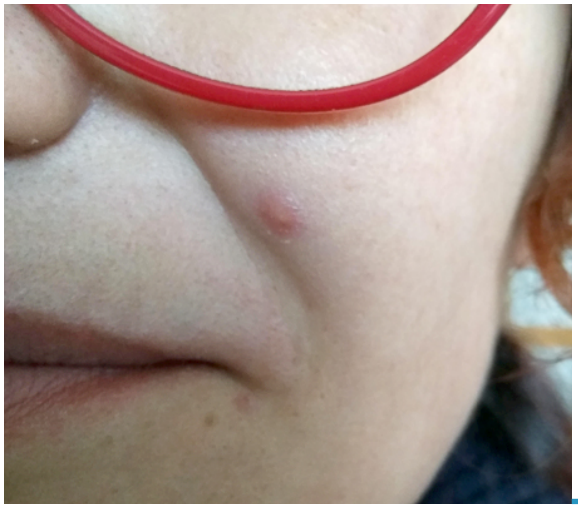

Figure 1. Spider bite on the left cheek. Localization and appearance five days after the bite.
Source: Own elaboration.

Figure 2. Place where the bite occurred. Patient's pets, which are of mixed race. The black and white dog was the one that ate the spider.
Source: Own elaboration

Some photographs were shown to the patient and she identified species of the genera *Latrodectus* or *Steatoda* as the possible arachnids that bit her. She stated that there were some spiders outside her house that were similar to the spider that bit her (Figure 3).

Figure 3. A. Spider that the patient said was similar to the one that bit her. The spider had nocturnal habits. B. Close-up of the spider where cephalothorax is visible. C. Lateral plane of the spider. The patient did not allow collecting this specific specimen for further identification.

Source: Own elaboration.

Taking into consideration the myriad of manifestations and the epidemiological importance of spider bites, the authors consider that this case was possibly caused by *Latrodectus* sp. or *Steatoda* sp. This accidental contact with a spider affected and caused toxicity in two different mammals (an owner and her pet) through a different route. Written informed consent was obtained from the patient for the publication of this case and the photographs.

DISCUSSION

Several spider species are known to have venom that causes harm to humans; unfortunately, good evidence coming from case reports is scarce, even considering that spider bites are relatively common. (30) For example, many of the published cases cannot be regarded as definitive spider bite incidents (5), since they do not fulfill the following characteristics (31): 1) evidence of a spider bite; 2) collection of the spider immediately after the bite; 3) identification of the spider by an expert. The last step is important because clinicians and medical staff can misidentify the spiders and catalogue the case erroneously. (5)

With these in mind, and bearing in mind the clinical characteristics reported by the patient, it could be said that this case report exposes five important clinical aspects. The first one is that physicians have to evaluate spider bite cases in an individual manner as most spider bites self-resolve and require neither extensive medical therapy nor the use of antivenin. (5,7)

The second aspect is the possible involvement of other people or species, in this case, the pet of the patient which ingested the spider. After ingesting the spider, the dog presented with envenomation through mucosae, which, to our knowledge, is not often reported. One example is the case of

a patient who was affected through the conjunctiva after being exposed to the body of a *Latrodectus hesperus*. (32) This type of cases may occur because *Latrodectus* spiders have toxins distributed throughout the body (33), and venom can be found even in their eggs (34); similar envenomation cases have been reported with other arthropods such as the puss caterpillar. (35) Unfortunately, cases similar to the dog could not be found, but the following questions remain:

- Do *Steatoda* spiders, in a way similar to *Latrodectus*, have toxins distributed throughout their bodies?
- Even without evidence of a bite site, did the spider in question bit the dog in the tongue or another part of the mouth?
- Did the dog get sick from another cause?
- Was another group of spiders involved?

The third characteristic is related to the photographs showed to the patient. It is necessary to wonder how useful or precise such action is. In this regard, were the clinical history and physical exam enough to reach a diagnosis? Did the patient see enough of the spider to recognize it? Was it really easy for her to recall the details and characteristics of the arachnid? This is important because these animals evoke an especial fear in people (36) and patients are anxious after being bit. In this case, the spider presented to us by the patient seems to have an orb web pattern (possibly an *Araneus granadensis* specimen) (37), while *Latrodectus* and *Steatoda* build them with a different pattern. (38,39)

The fourth aspect involves the challenge of making a definitive bite diagnosis. In this case, there was history and evidence of the bite, but the spider could not be collected as it was eaten by the dog.

Finally, the fifth characteristic was the refusal of the patient to collect a similar specimen (specifically the one she pointed). This fact, as well as the one mentioned in the previous paragraph, did not allow identifying the possible type of spider involved in the incident. In this case, it was especially relevant since the genera *Latrodectus* and *Steatoda* can be mistaken by patients and physicians, not only because of the shape of the spider's body, but also because the symptoms they cause are similar. (12) Both steatodism and latrodectism can present with erythema, pain, paresthesia, autonomic involvement, abdominal pain and papules. (16,40-42) However, steatodism tends to have milder manifestations and a shorter clinical course, while some clinical signs show a different pattern. (7,10)

With all this in mind, the cases presented in this report are considered to be secondary to the bite, and ingestion, of an unidentified *Steatoda* spider. Four main reasons support this conclusion:

1. Steatodism is suspected since the symptoms of the patient and her pet were not severe and they resembled low-grade latrodectism. (15)
2. The clinical history and course of these cases are similar to other reported bites caused by this genus of spider, either in Latin-America (43) or other parts of the world. (16)
3. This group of spiders are considered synanthropic and cosmopolite (44) and have been reported in several world regions (including South America). (43,45)
4. *Steatoda nobilis*, known as the noble false widow, is a highly invasive species and could have been involved in this case. (46,47) Its presence has been reported recently in Colombia (specifically Bogotá D.C.), Ecuador (44), Chile, and Argentina. (43,45)

Consequently, due to the mild presentation, the similarity with other cases of steatodism, the previous report of *Steatoda nobilis* near the area (44) and its similarity with low-grade latrodectism (15), this could be considered as a probable steatodism case, although it cannot be considered as a definitive diagnosis.

Most spider bites are mild in nature, but overemphasis on severe cases can sometimes lead to the use of unnecessary clinical measures, increase the cost of medical care, and reinforce popular beliefs, fears and myths surrounding spider bites. (5,7) This is particularly true for *Steatoda nobilis* as the media, in order to increase revenue and website traffic, makes sensationalist statements about its bite. (48,49) Nevertheless, necrosis or severe outcomes due to spider bites can happen but are extremely rare and secondary to the bite of certain spider species. (16) Lack of knowledge on these facts can generate the propagation of wrong information that contradicts experts. This is especially important because physicians and patients that live in non-endemic areas may believe that they know more about the distribution, identification and clinical characteristics of incidents involving spiders. (5,7) This happens in such a manner that clinicians can diagnose these attacks based on the remote possibility of transported spiders or minimal exposure, even when the spider is never found, seen or identified, or there is not a clear history of contact. (5,7)

In any case, although some spider bites are clinically important with dire consequences, these are the exception. Emphasis on spider bites has led to misdiagnosis of a wide array of diseases, sometimes with irreversible, serious or fatal consequences, as is the case of cancer and infectious diseases such as methicillin-resistant *Staphylococcus aureus*. (5,7)

Lastly, the strengths of this case are the extensive literature search conducted, the thorough medical examination and the comprehensive assessment of the patient. Its weaknesses were the impossibility of collecting and identifying the spider by experts and the lack of laboratory exams.

CONCLUSION

This case makes clear that not all spider bites should be the cause of apprehension and anxiety for the patient, given that most are self-resolving and need only analgesics and anti-inflammatory drugs. Treatment of spider bites can require more aggressive therapies, but this is established according to the situation. This article presents two possible cases of steatoda secondary to the accidental contact with a spider. This diagnosis is suspected due to the clinical characteristics and reported presence of the spider in the area. This case is novel because of the involvement of a female dog that was also affected by the same spider although in a different manner. It is necessary to better educate not only physicians but also patients to reduce and prevent further episodes of spider bites and to reduce the, sometimes, irrational fear of these arthropods. The limitations of this case include the lack of diagnostic tests in both the owner and the pet and the absence of the spider for collection and subsequent identification.

PATIENT'S PERSPECTIVE

The patient reports that she has no further concerns, that the pain in her face diminished and no other episode of fever appeared. She also reports that her dog is improving, although it still has some discomfort and vomit episodes. She is not worried about the skin area involved

because it was a small lesion and it is improving rapidly. She is not preoccupied for her dog either since its condition is also improving and was never dire.

CONFLICT OF INTERESTS

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ACUTE TUBULOINTERSTITIAL NEPHRITIS DUE TO THE USE OF RIFAMPICIN. CASE REPORT

Keywords: Nephritis; Interstitial; Acute Kidney Injury; Rifampin.
Palabras clave: Nefritis intersticial; Lesión renal aguda; Rifampicina.

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RESUMEN

Introducción. La rifampicina es un medicamento fundamental en la primera fase del tratamiento en la tuberculosis pulmonar; sin embargo, esta puede causar nefritis tubulointersticial aguda (NTIA) en raras ocasiones.

Presentación del caso. Paciente masculino con antecedentes de tuberculosis y en tratamiento con rifampicina, quien desarrolló lesión renal aguda. Al ingreso, el sujeto no registró anormalidades o antecedentes que explicaran lesión renal, pero sí presentaba acidosis tubular y síndrome de Fanconi asociado. La lesión renal concordó temporalmente con el uso de rifampicina y una biopsia de riñón confirmó NTIA. Se ordenó suspender el medicamento, con lo cual la función renal mejoró.

Discusión. La NTIA como un efecto secundario de la rifampicina es una enfermedad poco reportada, por tanto, al iniciar y al reiniciar el manejo con este medicamento se debe tener en cuenta el riesgo de desarrollarla.

Conclusión. La NTIA es uno de los efectos secundarios del tratamiento de la tuberculosis y, aunque es raro, debe tenerse en cuenta al iniciar el esquema de medicamentos para la tuberculosis.

ABSTRACT

Introduction: Rifampin is a cornerstone for the first phase of the treatment of pulmonary tuberculosis. This report presents the case of a patient with allergic tubulointerstitial nephritis (ATIN) due to rifampin, situation that has not been reported in Colombia.

Case presentation: A male patient with a history of pulmonary tuberculosis treated with rifampin developed acute kidney injury. On admission, no evidence of abnormalities or history to explain the injury was found, but he did present tubular acidosis and associated Fanconi syndrome. The kidney injury was temporarily consistent with rifampicin use, and a kidney biopsy confirmed ATIN. The drug was suspended, resulting in improved kidney function.

Discussion: ATIN as a side effect of rifampin is a scarcely reported disease. The risk of developing this condition should be considered when starting and restarting treatments with this medication.

Conclusion: ATIN is one of the side effects of tuberculosis treatment. Albeit rare, it should be considered when starting tuberculosis medications.

INTRODUCTION

Rifampicin is a first-line anti-tuberculosis antibiotic drug used to treat *Mycobacterium tuberculosis*. It inhibits the β subunit of bacterial RNA polymerase with a consequent inhibition of messenger RNA (1); its use can generate side effects, including liver and gastrointestinal involvement and acute kidney injury, which was reported in 0.05% of patients in a retrospective study conducted between 1987 and 1995. (2) Factors associated with increased risk of kidney involvement were reintroduction and intermittent use of rifampicin. (2,3)

The onset of acute kidney injury in patients using rifampicin for the first time has been barely reported in the literature. (4) These people have a favorable prognosis for recovery of kidney function, which can range from 73% (5) to 96% (2), while mortality can reach up to 1.6%. (2)

CASE PRESENTATION

A 32-year-old Hispanic male from Venezuela and living in Bogotá D.C., unemployed and with scarce socioeconomic resources, was admitted to the emergency department of the Hospital Universitario Mayor Méderi after being referred for outpatient treatment of tuberculosis. Treatment was started one month prior to consultation according to the four-drug fixed-dose combination regimen used to treat this condition (isoniazid, rifampin, pyrazinamide, and either ethambutol or streptomycin). (6)

The patient's kidney function was normal prior to antituberculosis management and he had no previous exposure to other medications, but given the abnormal results of laboratory tests regarding kidney function, he was referred to the emergency department. On admission, the patient was in good general condition; hydrated; without rashes, fever, dysuria, hematuria, abdominal pain, nausea, vomiting, fatigue, or decreased or increased amount of urine; he did not present any other symptoms on review of systems, nor manifested other relevant medical history. Physical examination revealed heart rate of 78 beats per minute, respiratory rate of 18 breaths per minute, and blood pressure of 118/68 mmHg. Fist percussion was negative and there was no abdominal pain, edema, or neurological abnormalities.

Creatinine test requested by the outpatient consultation service had values of 4.17 mg/dL. On admission, new tests were performed (Table 1), which showed elevated azoids, proteinuria in non-nephrotic range and metabolic acidosis with increased anion gap; lactic acidosis and diabetic ketoacidosis were ruled out as causes of these symptoms.

Table 1. Laboratory test results on admission.

Test	Results
Blood count	Leucocytes: 5 460, neutrophils: 3 750, lymphocytes: 840, eosinophils: 100, hemoglobin: 10.1 mg/dl, hematocrit: 31%, mean corpuscular volume: 83.3fL, mean corpuscular hemoglobin: 32pg, red blood cell distribution width: 16.8%, platelets: 360 000.
Urinalysis	Specific gravity: 1 008, pH: 5, proteins: 25 mg/dL, glucose: 100 mg/dL, red blood cells: 25xc, leucocytes: 5 xc, scarce bacteria and no eosinophiluria.
Electrolytes	Sodium: 136 mmol/L, potassium: 4.6 mmol/L, chlorine: 103 mmol/L, magnesium: 2.05 mmol/L.
Others	Prothrombin time: 16.1 s, thromboplastin time: 23 s, human immunodeficiency virus: negative, hepatitis b surface antigen: negative, hepatitis c antibodies: negative, cultures: negative.

Continues.

Test	Results
Arterial blood gases	pH: 7.38, partial pressure of oxygen: 86, partial pressure of carbon dioxide: 23, bicarbonate: 14, base excess: -9.4, lactate 1, ratio of partial pressure arterial oxygen and fraction of inspired oxygen: 415.
Additional	24-hour urine protein: 700 mg/dL, urine sodium: 99 meq/L, urine potassium: 19.6 meq/L, urine chlorine: 78.1 meq/L, glucose: 102mg/dL.
Immunological	Antinuclear antibodies: negative, anti-DNA: negative, anti-LA: negative, anti-RO: negative, anti-SM: negative, anti-RNP: negative, C3: normal, C4: normal, anti-neutrophil cytoplasmic antibodies: negative.

Source: Own elaboration.

Kidney and urinary tract ultrasound showed normal-sized kidneys with diffuse increase in echogenicity and no loss in corticomedullary differentiation.

The patient presented acute kidney disease KDIGO III (7), glomerular filtration rate of 23.38 mL/min calculated by cockroft, proteinuria in the non-nephrotic range, high anion gap metabolic acidosis, urine sediment with glycosuria, positive urine anion gap and normal central glucose. All this led to consider that there was proximal tubular involvement compatible with Fanconi syndrome.

Considering the acute renal injury with proximal and distal tubular involvement, the history of tuberculosis and that rifampicin is the most frequently involved drug in kidney failure in this type of cases (8), treatment was suspended and a kidney biopsy was indicated to confirm the origin of the failure and plan a treatment. After the suspension of rifampicin, azotemias improved until creatinine was normalized (Figure 1).

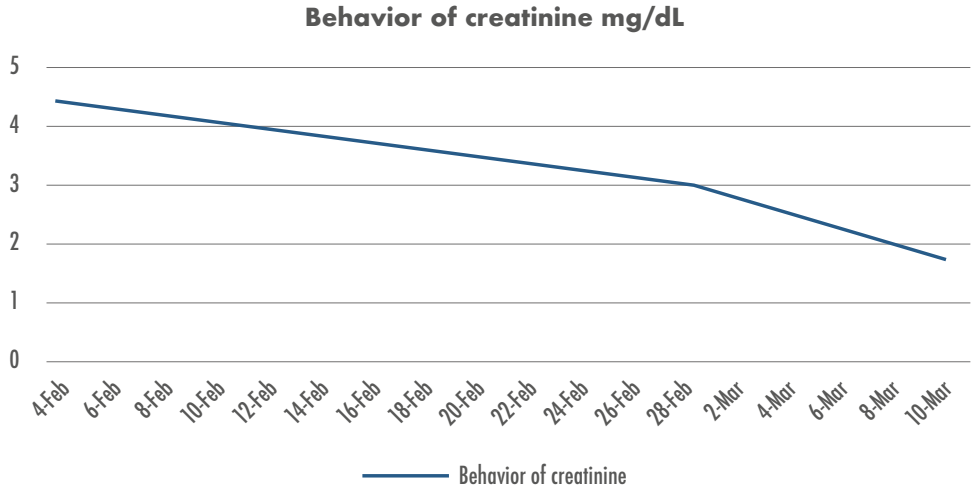

Figure 1. Behavior of creatinine.
Source: Own elaboration.

Kidney biopsy confirmed acute tubulointerstitial nephritis (ATIN) with inflammatory cells, eosinophils, and interstitial edema. The findings were also suggestive of drug hypersensitivity with associated tubular injury (Figure 2).

Figure 2 shows 23 normal glomeruli with normal basement membrane, no mesangial

expansion and no endocapillary or extracapillary proliferation. Tubulointerstitial findings included: interstitial inflammation of the whole cortical area; presence of mononuclear inflammatory cells (++++); eosinophils (++); plasmocytes (++); tubulitis (++) with focal rupture; degenerative changes of the tubular epithelium; detachment, flattening and cellular remains at intraluminal level with some neutrophils; extensive irregular vacuolization of the tubular epithelium; and irrelevant vascular findings that did not show sclerosis or hyalinosis.

Management with prednisolone at 1 mg/kg was initiated with stabilization of kidney function after 6 weeks. Once creatinine levels normalized (0.9 mg/dl), the patient was discharged; he continued with antituberculosis treatment and tests for follow-up of kidney function.

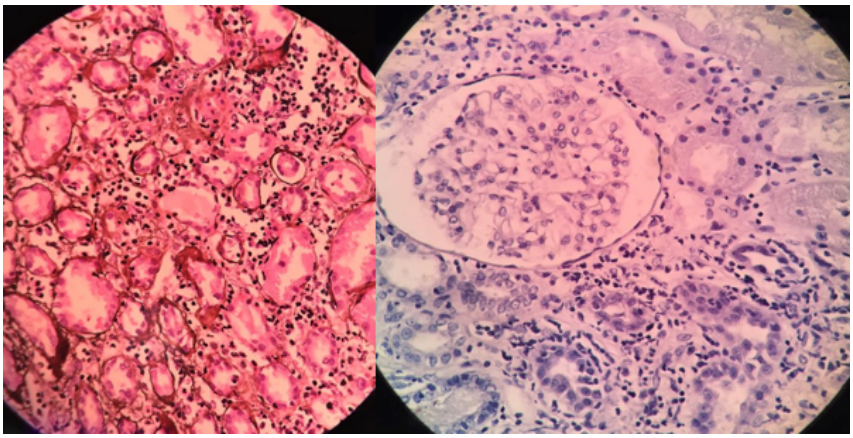

Figure 2. Glomeruli on light microscope.
Source: Document obtained during the study.

DISCUSSION

ATIN is defined as an infiltration of inflammatory cells into the renal interstitium that leads to oliguric or non-oliguric kidney injury and causes up to 27% of sudden kidney failures. (9) The causes may be allergic, infectious, autoimmune, systemic, idiopathic or drug-induced. (5,10)

Drug-induced ATIN is the most common form found in practice (up to 1/3 caused by antibiotics) and is characterized by a classic clinical triad (rash, fever, and urine eosinophils), occurring in less than 10% of patients. When it only shows kidney manifestations, this infiltration has a worse prognosis and its diagnosis is late, so in most cases it requires treatment with steroids. (11) Therefore, when it is suspected, a kidney biopsy, which is the gold standard for diagnosis, is necessary. (8,12)

Rifampicin rarely causes ATIN and its onset is associated with irregular drug intake or systemic symptoms of hypersensitivity. (9) On its physiopathological mechanism, antigen I, which is found in red blood cells and tubular cells, generates a response associated with immunoglobulin M and, to a lesser extent, with agglutination by immunoglobulin G in the presence of rifampicin. When the same response is obtained in vitro without the drug, such agglutination is not observed. (12)

Fanconi syndrome is an inherited or acquired disorder in the proximal renal tubules that results in excretion of amino acids, phosphate, bicarbonate and glucose. (13,14) Urine

anion gap is a useful tool to diagnose distal tubular involvement and to differentiate some of its causes, such as diarrhea, in patients with metabolic acidosis. It is calculated using the formula urine sodium + urine potassium - urine chlorine, and is considered positive when the value is between 20 and 90 (15); in the reported patient, the value of this anion was 40.

Although the patient was asymptomatic, ATIN diagnosis was achieved based on the findings in urine sediment, the temporal relationship with the administration of anti-tuberculous drugs, and the fact that rifampicin is the drug most associated with this pathology. (8,16)

Some publications on this subject can be found in the literature. Chang *et al.* (5), in a study conducted in Taiwan, studied acute kidney disease in patients treated with the four-drug tuberculosis regimen and found that it occurred in 7.1% of patients, of whom 11% developed the disease after first exposure to rifampicin. Muthukumar *et al.* (3) published a case series of 25 patients with acute kidney disease secondary to the use of rifampicin; the patients presented with oliguria, and the most common histological finding was ATIN, which might be associated with anemia (96%), hemolysis (17%) and thrombocytopenia (50%), and could help create a diagnostic approach and reach clinical suspicion. (2) Given that Bogotá is located more than 2 600 meters above sea level, and that the reported patient was anemic, the associated physiopathology correlated with antigen I. (12) Finally, the study by Schubert *et al.* (8), conducted between 1995 and 2007, evaluated the clinical features and complications of ATIN treated with the four-drug TB regimen, which was typically associated with re-exposure to the drugs; AITN occurred in 5% of patients and had a presentation range of 1 to 21 days after the initiation of the treatment. (8)

The literature reviewed in PubMed and SciELO did not report any other cases of ATIN by rifampicin in Colombia, but there were contradictory results with respect to treatment for this disease with steroids. The review by González *et al.* (17) suggests significant improvement in kidney function, while Effa *et al.* (18) did not find any difference regarding the improvement of kidney function. No case reported the use of a defined dose of steroids, and the studies on which systematic reviews were conducted were very heterogeneous, mostly retrospective case reviews. In this patient, it was decided to start treatment with steroids for 6 weeks at 1 mg/kg, after which outpatient treatment was continued with complete recovery of kidney function.

CONCLUSIONS

Since there are few reported cases of ATIN in Latin America and it is a rare complication associated with rifampicin use, this case report is useful as it warns clinicians to suspect this disorder in patients who initiate or restart anti-tuberculous treatment and have subsequent kidney failure. To confirm the suspicion, further studies evaluating the effectiveness of steroids in ATIN by rifampicin at defined doses in high-prevalence tuberculosis settings should be conducted in order to define the usefulness of steroid use.

ETHICAL CONSIDERATIONS

The patient signed and gave informed consent for this case report.

CONFLICT OF INTEREST

None stated by the authors.

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https://doi.org/10.15446/cr.v6n1.80451

COMPLEX REGIONAL PAIN SYNDROME SECONDARY TO SACROCOCCYGEAL DISLOCATION FOLLOWING TRAUMA TO THE LUMBOSACRAL REGION. CASE REPORT

Keywords: Complex Regional Pain Syndromes; Neuralgia; Causalgia; Quality of Life.
Palabras clave: Síndromes de dolor regional complejo; Neuralgia; Causalgia; Calidad de vida.

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RESUMEN

Introducción. El síndrome doloroso regional complejo (SDRC) es una patología poco frecuente que se caracteriza por causar compromiso a nivel inflamatorio, vasomotor y del sistema nervioso central (SNC). Su presentación clínica puede ser subaguda, aguda o crónica y puede afectar considerablemente la calidad de vida del paciente.

Presentación del caso. Paciente femenina de 21 años con trauma en región lumbosacra asociado a dolor y limitación funcional, a quien se le practicaron imágenes diagnosticas que evidenciaron luxofractura sacrococcígea con posterior presencia de síntomas inflamatorios y autonómicos (agudos y crónicos) que se trataron con medicamentos y cirugía. La paciente respondió al tratamiento con mejoría de la sintomatología a largo plazo.

Discusión. El SDRC se presentó posterior a un traumatismo y ocasionó sintomatología subaguda que se agudizó hasta llegar a la presentación crónica de la enfermedad. La inflamación, la disfunción vasomotora y el compromiso del SNC hacen de este caso un reto diagnóstico y terapéutico multidisciplinario.

Conclusión. El SDRC es una patología poco frecuente y de difícil diagnóstico; sin embrago, es necesario diagnosticarlo de forma oportuna para poder iniciar un tratamiento personalizado, ya que es una enfermedad que compromete considerablemente la calidad de vida del paciente.

ABSTRACT

Introduction: The complex regional pain syndrome (CRPS) is a rare condition characterized by inflammatory, vasomotor and central nervous system (CNS) involvement. Its clinical presentation can be subacute, acute or chronic, and may have severe effects on the patient's quality of life.

Case description: 21-year-old female patient with trauma in the lumbosacral region associated with pain and functional limitation. Diagnostic imaging showed sacrococcygeal dislocation with subsequent inflammatory and acute and chronic autonomic symptoms that were treated medically and surgically. The patient responded to treatment with long-term improvement of the symptoms.

Discussion: In this case, CRPS occurred after trauma and caused subacute symptoms that became even more acute until reaching a chronic presentation. Inflammation, vasomotor dysfunction and CNS involvement made this case a multidisciplinary diagnostic and therapeutic challenge.

Conclusion: CRPS is a rare disease that is difficult to diagnose. However, diagnosis should be timely in order to initiate personalized treatment, since this disease considerably affects the patient's quality of life.

INTRODUCTION

Complex regional pain syndrome (CRPS) is a condition that affects 7% of patients with fractures and/or surgeries in the limbs or other injuries. Its clinical features include subacute, acute and chronic symptoms with autonomic and inflammatory characteristics. The condition of people with this syndrome improves within the first year, but in some patients, the disease progresses to its chronic form, usually in parallel with inflammatory symptoms, which prevail over autonomic ones. (1) CRPS is classified into two types: type 1, with no nerve damage, and type 2 (causalgia), with identifiable nerve damage. (2,3)

CRPS manifests with localized pain associated with neuropathic pain (temperature changes, hyperalgesia and allodynia) and autonomic dysfunction (motor and sudomotor involvement). It may also be observed in regions distant from the site of injury. The etiology of this syndrome is not completely clear, although its physiopathology shows evidence of involvement at the central nervous system (CNS) and peripheral levels. (4)

This case describes the clinical evolution of a patient who, after a trauma, presented neurological, vasomotor and inflammatory symptoms, which together are characteristic of CRPS. However, diagnosis was difficult to achieve because of the diversity of the symptoms; therefore, it was necessary to carry out personalized treatment according to the symptoms.

CASE PRESENTATION

A 21-year-old female patient, mestizo, unemployed, of a middle-income household and without significant medical history, attended the emergency service of a trauma center due to a trauma in the lumbosacral region secondary to a traffic accident (the woman was a passenger on a motorcycle when a car hit them from behind).

Physical examination showed pain and edema on palpation in the affected areas, so comparative hip scan and lumbosacral spine tomography were performed, obtaining normal results. The woman was assessed by the orthopedic and neurosurgical services, and single intravenous doses of dipyrone (2g) and tramadol (50mg) were administered for pain management. After this drug treatment, pain decreased and the patient was discharged.

One week later, the patient returned to the emergency department reporting intense pain (10 points on the pain scale) in the lumbosacral region associated with difficulty to sit. On physical examination, she presented edema, pain and decreased mobility of the arches. The woman was assessed by neurosurgery, which ordered lumbosacral spine tomography and lumbosacral spine nuclear magnetic resonance imaging (LSN-MRI), reaching a diagnosis of sacrococcygeal dislocation (Figure 1). She was discharged with orders for outpatient treatment with acetaminophen 500mg every 6 hours, diclofenac 100mg per day, and pregabalin 50mg every 12 hours, and instructions to sit on a flotation cushion.

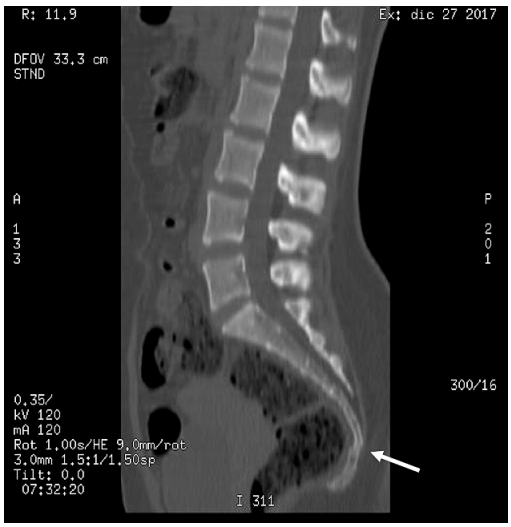

Figure 1. Lumbosacral spine CT showing sacrococcygeal dislocation.

Source: Document obtained during the study.

Four weeks later, the patient returned to the emergency department due to further trauma to the coccygeal region while riding in a car; the woman reported severe pain in the lumbosacral region with inability to walk. Physical examination showed pain in lumbosacral spine region when moving the lower limbs, good capillary filling and absence of paresthesia in lower limbs. The patient was assessed by the neurosurgery service with new imaging that showed no changes; intravenous analgesic treatment was given: dexamethasone (8mg), tramadol (50 mg\mL) and dipyrone (2g). She was discharged based on the improvement of the symptomatology.

Six weeks later, the patient attended a follow-up appointment and reported referred pain in the sacrococcygeal region that radiated to the bilateral inguinal region when sitting down that became more acute when performing Valsalva's maneuvers. Symptoms were treated with amitriptyline (25mg every night), acetaminophen+codeine (500 mg\8mg every 8 hours) and bisacodyl (5mg every night) for constipation.

A follow-up appointment took place four weeks later, and the patient reported persistence of radicular pain in the coccygeal region, which intensified when sitting and walking, so a peridural block was indicated. Four weeks later, during a new follow-up appointment, the woman said that her symptoms improved only during the first two weeks after the procedure, and on physical examination she reported permanent pain in the coccygeal region with little tolerance to palpation, even in decubitus; consequently, the neurosurgery service indicated coccygectomy. Five days after the procedure, she presented radicular pain and limited mobility of the left leg irradiated to the ipsilateral ankle. Given the symptomatology, neuralgia was considered and treatment with pregabalin was initiated (150mg every 12 hours); the symptoms improved and she was discharged.

Fifteen days after the last discharge, the patient was readmitted to the emergency department for moderate bleeding on a surgical wound associated with general discomfort and chills. Physical examination revealed suture dehiscence, moderate bleeding, erythema, flushing and heat. The neurosurgery service performed a new assessment and indicated surgical washing and resuturing the wound; a culture was taken, and it was positive for *Escherichia Coli*, so 2g of cefazolin were administered every 8 hours. The patient presented monoparesis in the lower left limb during hospitalization, so a new LSNMRI was requested, yielding normal results.

During the second week of hospitalization, the patient presented radicular pain in the lower left limb, minimal sensory changes in the left L5-S1 segment (partial objective difference in distal S1 strength and minimal difference in ipsilateral L5), sensory alteration of the lower left limb (from L5 to S1) and changes in temperature, hypostesia, allodynia and coloration in the dorsum of the left foot (Figure 2).

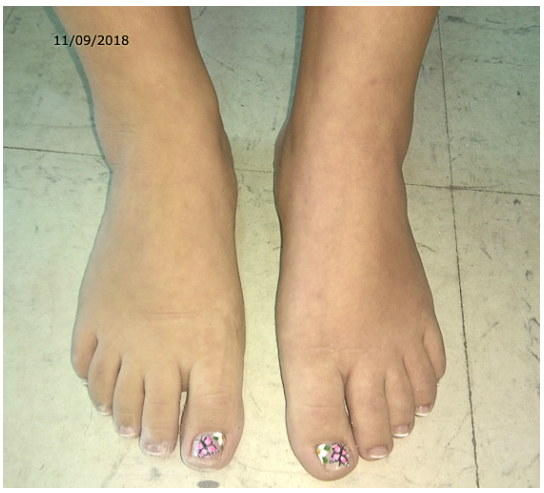

Figure 2. Color changes and edema in the left foot.
Source: Document obtained during the study.

Considering the mechanism of trauma, the time of evolution of the patient, the type of injury and the symptomatology, it was concluded that the woman suffered from Type I CRPS (post-traumatic). Treatment was initiated with topical capsaicin, amitriptyline (25mg per day), prednisolone (15mg per day), pregabalin (150mg per day), acetaminophen (1000g every 8 hours) and physical therapy. In addition, based on her limited mobility and frequent pain, the woman felt worried and depressed, so she required support from the psychology service, and accompaniment from her family group.

In the third week of her hospital stay, the symptoms improved; she was able to move around with the help of a walker and was subsequently discharged. Two weeks later, she attended a follow-up appointment, finding paresis (3/5) in the left crural nerve, paresthesia in the left L4-L5-S1 segment, and change of color and increased temperature in the distal region of the left lower limb. In addition, the surgical wound (sacrococcygeal region) showed severe discharge without signs of local infection associated with suture dehiscence. A pelvic MRI was performed showing surgical wound level collection with density of clear serous fluid (Figure 3).

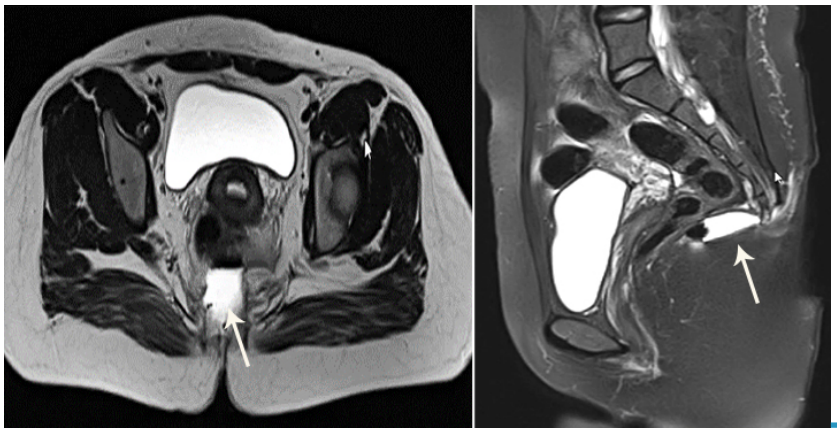

Figure 3. Pelvic MRI showing collection at the surgical wound site.
Source: Document obtained during the study.

Assessment by plastic surgery was requested, reporting that the surgical wound was not deep enough to compromise vital structures and that, due to its location, expectant management was sufficient for closure by secondary intention. Finally, the patient began physical therapy treatment, recovering motor function. It should be noted that although the patient was treated with different medications, she had no side effects and had good adherence to the treatment.

DISCUSSION

The origin of the CRPS involves several aspects that must be taken into account to understand its complexity:

Inflammatory mechanisms

Cytokines and nerve growth factor (NGF) released after tissue trauma can stimulate nociceptors, leading to long-term peripheral sensitization. (5,6) The activation of primary nociceptors generates a retrograde depolarization of small diameter primary afferents (also known as axonal reflex) that release substance P (SP) and calcitonin gene-related peptide (CGRP) from the sensitive nerve endings of the skin. This process leads to vasodilation and protein extravasation in the tissue, and causes classic clinical signs of CRPS (redness, heating, edema). (7)

In skin biopsy results, the levels of tumor necrosis factor α and interleukin-6 are higher in

patients with CRPS than in those who are not affected, a difference that is solved within six years after the injury. (8) Pro-inflammatory cytokines are likely to act not only locally but also at the spinal cord —perhaps secondary to sensitization of nociceptive neurons or neuronal interaction—, leading to mechanical hyperalgesia. (9)

Studies such as Blaes *et al.* (10) and Kohr *et al.* (11) establish that about 35% of CRPS patients generate surface binding autoantibodies against sympathetic and mesenteric plexus neurons. It is possible that the antigens of these auto-antibodies are adrenoreceptors α and acetylcholine muscarinic receptors. It should be noted that this is only one hypothesis which should be further studied, since patients have not presented, so far, generalized autonomic failure caused by the action of serum autoimmune antibodies.

Vasomotor dysfunction

With this type of dysfunction, patients feel that the affected limb is warmer or cooler compared to the opposite limb. Vasomotor dysfunction is more common than previously thought in patients with CRPS (12) and has three different presentations (13):

1. Hot/warm: the affected limb is warmer than the opposite limb, there are elevated norepinephrine levels in terms of venous circulation in the affected area, and it lasts an average of 6 months.
2. Intermediate: the affected limb may be warmer or cooler than the non-affected limb depending on sympathetic activity, and lasts an average of 5 months.
3. Cold/blue: the affected limb has decreased temperature and low norepinephrine levels compared to the opposite limb, which lasts for more than 6 months.

In summary, besides inflammatory vasodilation, there is also unilateral inhibition of cutaneous vasoconstrictive sympathetic neurons. This condition in the thermoregulatory system can be caused by functional changes triggered by the initial trauma to the spinal cord, brain stem, or brain.

Finally, in the chronic presentation of CRPS, altered neurovascular transmission and hyperreactivity of blood vessels to circulating catecholamines tend to prevail. It should be noted that not all patients with the syndrome present the characteristics mentioned above; for example, those who have the syndrome as a result of poor activity of cutaneous vasoconstrictive sympathetic neurons in nocireceptors develop sensitivity to catecholamines, which contributes to pain symptoms. (14,15)

Central Nervous System (CNS)

In patients with CRPS, the CNS undergoes functional and structural changes that generate persistent pain and central sensitization, increasing the excitability of spinal cord neurons. (16) Sensitized spinal nociceptive neurons, on the other hand, are more receptive to the input of peripheral stimuli and can generate impulses in the absence of stimuli, resulting in chronic pain (which can sometimes radiate into nearby uninjured areas), hyperalgesia and allodynia. (16) Activation and regulation of glutamate receptors make signal transmission in the nociceptive circuit from the spinal cord to the cortex more effective. (17)

It has been shown that patients with chronic CRPS perceive their affected limb to be longer than it actually is. (18) They also present distortions of the mental image of their limb (temperature and shape) and develop a feeling of hostility towards it. (19)

Diagnosis

CRPS diagnosis is mainly clinical; it is based on the presence of symptoms and signs associated with the autonomic, motor and sensory disorders described above, and also on the Budapest criteria, which have a sensitivity of 85% and specificity of 69%. (20) In order to consider CRPS, the patient must have at least one of the signs from the four categories posed by these criteria.

Before determining that the patient suffers from CRPS, other pathologies must be ruled out, such as rheumatic diseases, arthritis, post-surgical infections, cellulitis, neuritis, neuralgia, thrombosis, compartment syndrome, among others. X-rays and bone scans are tests that help achieve the diagnosis. (21)

Treatment

Patients with CRPS must have a positive and active attitude to achieve adequate rehabilitation in the shortest time possible. Regular physical and occupational therapy help reduce pain and motor impairment, especially in early presentations of the syndrome, and improves the coordination of the limb. (22) In some cases, transcutaneous electrical nerve stimulation, which is not tolerated by patients with allodynia and hyperalgesia, may be helpful for pain reduction therapy. In this sense, it is necessary to establish a personalized treatment for each patient according to their need. (23)

Primary care for CRPS usually begins with non-steroidal anti-inflammatory drugs to slightly decrease pain; if the pain is neuropathic, gabapentin (24,25) and opioids show favorable results. (26)

Opioids tend to be less effective for controlling chronic neuropathic pain compared to acute conditions. (27) In addition, they produce different side effects and can generate tolerance and hyperalgesia. (28) Therefore, when prescribing them to treat CRPS, it is important to consider that they reduce pain and can help improve the quality of life in some patients, but they can generate more pain and dysfunction in others. Intravenous administration of lidocaine is also effective to control neuropathic pain and CRPS (29) by reducing the degree of pain, whether spontaneous or evoked. (30)

The treatment of CRPS has been studied by several authors, who argue that it can be managed using different drugs. Van Hilten *et al.* (31) reported that baclofen helps improve associated dystonia; Adami *et al.* (32) and Varenna *et al.* (33) state that bisphosphonates are effective to control pain, swelling and mobility; Schwartzman *et al.* (34) and Sigtermans *et al.* (35) found that intravenous administration of ketamine significantly reduces pain scores and improves motor function, as allodynia in patients who received it showed significant improvement in the affected limb, turning it into a good therapeutic option. (36)

Capsaicin is a topical treatment that can be useful in patients with CRPS as it potentiates the release and inhibits the reception of P substances from the afferent polymodal non-myelinated terminals; therefore, it has an analgesic effect on some presentations of neuropathic pain (37), although in some patients, it may produce a burning sensation that is difficult to tolerate. (38,39) This side effect can be so severe that a regional anesthetic block must be performed in order to continue treatment at high doses. (40)

Some studies show a decrease in pain in patients with CRPS who undergo sympathectomy. (41,42) Other procedures that have proven to be effective to reduce pain and improve CRPS are spinal cord stimulation (43) and peripheral nerve stimulation. (44)

In the clinical case presented here, this condition developed after receiving a trauma in a localized region, which was not severe nor compromised the quality of life of the patient at first, and then she experienced gradually a variety of non-specific, varied, irregular and recurrent symptoms (which became chronic). This meant that CRPS could only be diagnosed in the presence of inflammatory, vasomotor and neurological symptoms that led the treating physicians towards that diagnosis. Since the symptomatology did not improve, or partially improved, and new symptoms appeared, the therapeutic approach focused on improving the patient's quality of life and initiating early physical rehabilitation; however, this was not enough, so other therapeutic options had to be implemented (from blocks to coccygectomy). Unfortunately, these measures only led to a partial and short-lived improvement and then the symptoms worsened.

The clinical condition of this patient posed a great challenge for the treating physicians, so it was necessary to make a multidisciplinary therapeutic approach to improve her evolution. Thanks to that multidisciplinary work, the adherence to the treatment, the absence of side effects and the disposition and determination of the patient, her quality of life improved to the point of resuming a normal daily life.

CONCLUSIONS

This clinical case made evident that CRPS has a variety of non-specific symptoms that may become acute despite the treatment, and is therefore considered a difficult disease to diagnose.

Since the cause of this disease is multifactorial, a multidisciplinary therapeutic approach must be adopted, not only focusing on medical aspects, but also on psychological aspects in order to improve the quality of life of the patient and to enable him/her to return to his/her daily routine as soon as possible. Consequently, more efforts should be made to better understand the specific mechanism by which CRPS occurs and thus train medical personnel to initiate appropriate and timely multidisciplinary treatment.

ETHICAL CONSIDERATIONS

In order to disclose this clinical case, the patient signed the corresponding informed consent after it was explained to her.

CONFLICT OF INTERESTS

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PNEUMOMEDIASTINUM AND PNEUMOPERICARDIUM IN AN ADOLESCENT WITH ASTHMA ATTACKS. CASE REPORT

Keywords: Asthma; Pneumothorax; Subcutaneous Emphysema; Mediastinal Emphysema; Pneumopericardium.
Palabras clave: Asma; Neumotórax; Enfisema subcutáneo; Enfisema mediastínico; Neumopericardio.

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RESUMEN

Introducción. El neumomediastino se define como la presencia de aire en la cavidad mediastinal; esta es una enfermedad poco frecuente que puede aparecer por procedimientos quirúrgicos, traumas o espontáneamente (siendo el asma es un factor frecuentemente asociado) y que tiene amplios diagnósticos diferenciales debido a su sintomatología y signos clínicos.

Presentación del caso. Paciente femenina de 17 años de edad con síntomas respiratorios de 2 días de evolución que consistían en disnea, dolor torácico irradiado a cuello y hombros, enfisema subcutáneo supraclavicular derecho, sibilancias en ambos campos pulmonares, taquicardia y taquipnea. Al ingreso, los exámenes paraclínicos evidenciaron leucocitosis y neutrofilia, y la radiografía de tórax mostró enfisema subcutáneo en la región supraclavicular derecha. Se confirmó diagnóstico de neumomediastino con tomografía axial computarizada de tórax y se hospitalizó para manejo con evolución satisfactoria.

Discusión. El neumomediastino se presenta principalmente en pacientes jóvenes con asma y está asociado a la exacerbación de esta, asimismo, puede generar otras complicaciones en sitios continuos, como el neumopericardio del presente caso. El curso de la enfermedad es usualmente benigno y de buen pronóstico.

Conclusión. Por su presentación, el neumomediastino requiere una importante sospecha clínica para poder orientar su diagnóstico y tratamiento; por tanto, la imagenología es fundamental.

ABSTRACT

Introduction: Pneumomediastinum is defined as the presence of air in the mediastinal cavity. This is a rare disease caused by surgical procedures, trauma or spontaneous scape of air from the lungs; asthma is a frequently associated factor. It has extensive differential diagnoses due to its symptoms and clinical signs.

Case presentation: A 17-year-old female patient presented with respiratory symptoms for 2 days, dyspnea, chest pain radiated to the neck and shoulders, right supraclavicular subcutaneous emphysema, wheezing in both lung fields, tachycardia and tachypnea. On admission, laboratory tests revealed leukocytosis and neutrophilia, and chest X-ray showed subcutaneous emphysema in the right supraclavicular region. Diagnosis of pneumomediastinum was confirmed through a CT scan of the chest. The patient was admitted for treatment with satisfactory evolution.

Discussion: Pneumomediastinum occurs mainly in young patients with asthma, and is associated with its exacerbation. This condition can cause other complications such as pneumopericardium, as in this case. The course of the disease is usually benign and has a good prognosis.

Conclusion: Because of its presentation, pneumomediastinum requires clinical suspicion to guide the diagnosis and treatment. In this context, imaging is fundamental.

INTRODUCTION

Pneumomediastinum, also known as mediastinal emphysema, is defined as the presence of air in the mediastinum. It can be secondary to surgery, visceral perforation, infection, or trauma, but it can also occur spontaneously and is known as spontaneous pneumomediastinum (1) or Hamman's syndrome. This entity is rarely observed in emergency departments. (2)

This condition can be classified into two groups. On the one hand, spontaneous pneumomediastinum has no primary cause identified and, on the other, secondary pneumomediastinum has clear causes, such as penetrating trauma, closed chest trauma, recent interventions in the esophagus or tracheo-bronchial tree, pneumothorax, mediastinal or pulmonary infection by gas-producing germs, among others. (3)

Spontaneous pneumomediastinum was first described in 1819 by Laënec (3), and refers to the spontaneous rupture of the alveolus in situations of increased alveolar pressure (coughing, vomiting or Valsalva maneuvers). One of its associated conditions is asthma, as the mediastinal cavity is bounded laterally by the pleura, the diaphragm at the lower level, and the thoracic inlet at the upper level.

Moreover, pneumopericardium is defined as the presence of air in the pericardial cavity. This is a rare complication and few cases related to asthma have been reported, since it is associated with mechanical ventilation in newborns and with iatrogeny, trauma, tumors, infections or idiopathic appearances in adults. This pathology, which can often coexist with pneumomediastinum, was first described by Bricketeau in 1844. He found a sign known as *bruit de moulin,* which is a sound similar to that produced by the blades of a mill when they hit the water. (4,5)

A patient with pneumopericardium may present mediastinal tympanism, pulsus paradoxus, jugular vein distention and muffled heart sounds; in addition, electrocardiogram may show tachycardia and signs of pericarditis. Large pneumopericardium can produce cardiac tamponades that require early diagnosis and treatment, but these are mostly mild conditions that respond to supportive measures. (4,5)

CASE PRESENTATION

A 17-year-old female student from Girón (Santander, Colombia; 777 m.a.s.l.), from a middle-class household, non-smoker, with a history of asthma diagnosed since childhood (age not specified) and without treatment, attended the emergency room after experiencing symptoms for 2 days. They included persistent cough with greenish expectoration, dyspnea, wheezing, chest tightness, cough associated with cyanosis, dysphagia, and chest pain radiating to the neck and shoulders.

Physical examination found: blood pressure: 122/82 mmHg, heart rate: 107 beats per minute, respiratory rate: 22 breaths per minute, oxygen saturation: 97% at room temperature, temperature: 36°C and wheezing in both lung fields. The patient also reported pain in the right supraclavicular region and anterior neck, and subcutaneous emphysema was found in the right supraclavicular region on palpation (Table 1).

Table 1. Laboratory tests on admission.

Blood count	Leucocytes 17 200 cells/mm^3
	Neutrophils 79.2%
	Hemoglobin 15 g/DL
	Hematocrit 44.7%
	Platelets 367 000
Kidney function	Creatinine 0.72 mg/dL
	Urea Nitrogen 16.3 mg/dL
Arterial blood gas	pH: 7.458, PO_2: 62.2, PCO_2: 32.7, $SatO_2$: 92.8%
	HCO_3: 22.6 mmol/L, BE: -0.4 mmol/ L
Lactate	1.72 mmol/L

Source: Own elaboration.

Posteroanterior and lateral chest x-rays were taken, showing normal cardiac silhouette without pleural effusions or flattening of the diaphragm, but increased bronchovascular network without consolidation towards the lung bases and subcutaneous emphysema towards the right supraclavicular region with possible pneumomediastinum (Figure 1).

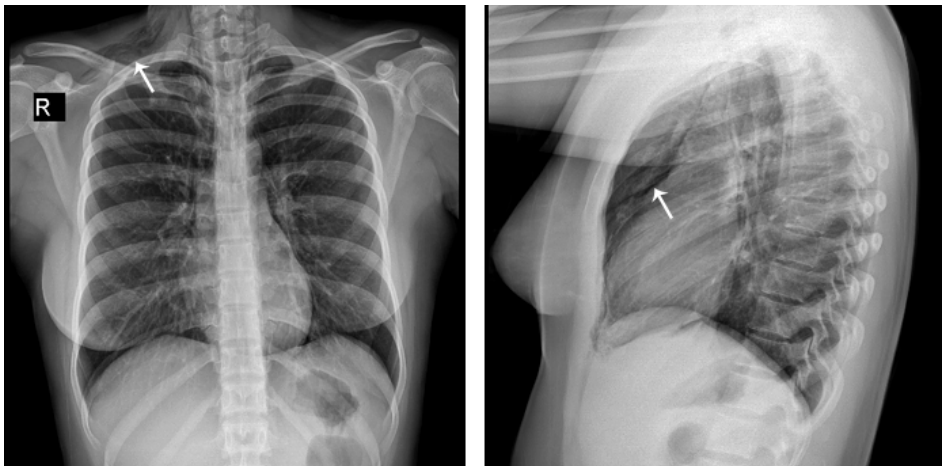

Figure 1. Posteroanterior and lateral chest x-rays.
⇨ Subcutaneous emphysema in right supraclavicular region and air in mediastinum.
Source: Document obtained during the study.

Since pain in the supraclavicular region and right anterior neck was persistent and pneumomediastinum was suspected, a computed tomography (CT) scan of the chest was indicated, confirming pneumomediastinum. There, air was observed dissecting the mediastinal planes and the base of the neck, with extension to the supra scapular region on the right side; discrete pneumopericardium was also evident (Figure 2).

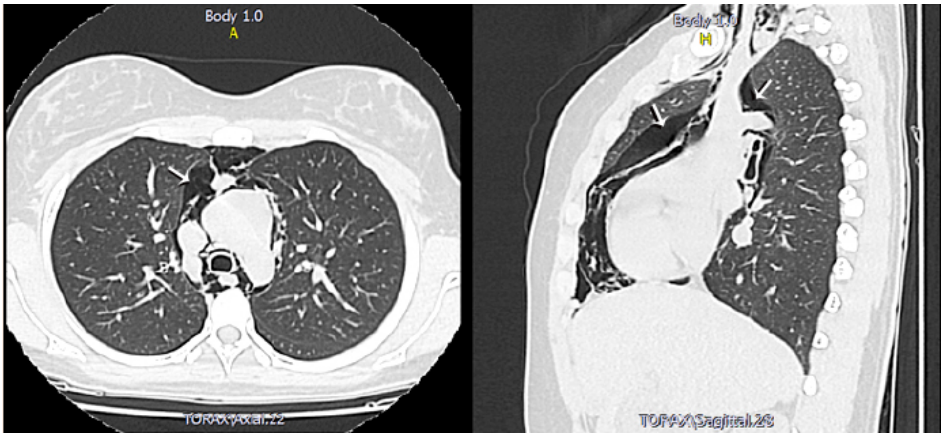

Figure 2. CT Scan of the chest.
⇨ Pneumomediastinum and pneumopericardium.
Source: Document obtained during the study.

Based on these findings, the patient was admitted to the hospital and advised to rest, receive oxygen by nasal cannula, respiratory therapy with bronchodilators (initially salbutamol and berodual through nebulization, and later salbutamol in spray by schedule), systemic corticoid (initially intravenous hydrocortisone and later oral prednisone), and 1.5g of intravenous ampicillin sulbactam every 6 hours.

The patient was assessed by the pneumology service, which considered that she was suffering from moderate asthma attacks, acute bronchitis with pneumomediastinum, and pneumopericardium. For this reason, bronchodilator and corticoid treatment was continued, and clarithromycin 500mg orally every 12 hours was added to the antibiotic treatment, which continued to be ampicillin sulbactam until completing 7 days. She had good adherence to treatment and showed no adverse reactions.

Table 2. Follow-up laboratory tests.

Blood count	Leucocytes 10.400 cells/mm^3
	Neutrophils 56.2%
	Hemoglobin 12.9 g/DL
	Hematocrit 37.2%
	Platelets 288 000 Erythrocyte sedimentation rate: 8

Source: Own elaboration.

Finally, a follow-up chest x-ray showed normal cardiac silhouette with increased bronchovascular network without consolidation towards the bases; no pleural effusions or flattening of the diaphragm were found. The patient completed the antibiotic treatment established by pneumology with adequate clinical response, resolution of wheezing, improvement of dyspnea and absence of subcutaneous emphysema, so she was discharged with medical recommendations and warning signs.

DISCUSSION

Pneumomediastinum is a rare entity with a prevalence of 1 case per 7 000-44 000 hospital admissions. It is more frequently observed in young patients without comorbidities, with the exception of asthma, and more than 75% of the cases occur in males with an average age of 20. (6)

Two incidence peaks have been reported in the pediatric population: in children under seven years of age, probably secondary to lower respiratory tract infections, and in adolescents, due to asthma attacks and upper respiratory tract infections. (7) The increase in intrathoracic pressure is the main predisposing factor: the rupture of the alveoli, secondary to a difference in pressure gradients between the alveoli and the mediastinum, moves the air from the place with the highest pressure gradient (intra-alveolar space) to the mediastinal structures with the lowest pressure gradient. (8) The dissection to release the free air is not only limited to the mediastinum, as this communicates with the mandibular space, the retropharyngeal space and the vascular beds within the neck. Once in the mediastinum, air can flow and cause pneumoperitoneum, pneumothorax and subcutaneous emphysema, although free air has also been found in the peritoneum, causing pneumoperitoneum. (1,9)

Regarding severe asthma, pneumomediastinum develops due to the over-expansion of the distal airways caused by bronchial obstruction with subsequent alveolar rupture. The most common symptoms described in the literature are dyspnea and chest and neck pain. (10,11) Chest pain is acute, retrosternal and pleuritic, and may radiate to the neck, dorsal region or shoulders. (10) Neck edema and odynophagia have also been reported and, on physical

examination, neck skin crackles are palpated, a finding consistent with subcutaneous emphysema. (11)

Rarely, voice changes and dysphagia may be observed, which are secondary to the displacement, usually anterior, of the larynx and esophagus by the air present between the fascias. (12) The accumulation of air between the anterior parietal pericardium and the underlying chest wall can produce a crackling in the precordium region, which is synchronized with heart sounds. (10,12) In the case presented here, the patient's symptoms coincided with the literature, which reports that this pathology can occur in asthmatic patients, generally in contexts of exacerbation of respiratory symptoms. Clinically, there are no signs that allow associating pneumopericardium with asthma.

Patients with suspected pneumomediastinum diagnosis should undergo anteroposterior and lateral chest x-ray that includes the cervical area. (3) Confirmatory imaging findings include signet ring sign around the artery, double bronchial wall sign, continuous diaphragm sign, thymic sail sign, and subcutaneous emphysema. (3,8) The results of this test are usually normal in 10-30% of patients, especially in supine projection. (3)

If the x-ray does not provide information, the chest CT will lead to the diagnosis, as it has been shown to be superior to x-ray in locating and measuring the extent; it is also important for differential diagnosis. (6,8) In this case, the disease was confirmed based on the images, which showed pneumopericardium, although no clinical sign had been reported.

In general, pneumomediastinum is benign and has good prognosis (1); its treatment is usually conservative, based on pain management, rest and bronchodilators. In addition, Valsalva maneuvers should be avoided and sometimes antibiotics and oxygen are necessary (6,10), reaching clinical resolution around the fourth day. (8) Pneumopericardium may resolve spontaneously, but in some cases pericardial drainage is necessary, especially with signs of tamponade. (5)

The differential diagnosis of spontaneous pneumomediastinum includes pneumothorax, pulmonary embolism, pericarditis, tracheobronchial tree rupture and Boerhaave syndrome (retrosternal chest pain and subcutaneous emphysema in the neck after vomiting). (12)

CONCLUSION

Spontaneous pneumomediastinum is a rare condition that has signs and symptoms that may suggest several diagnostic options, ranging from general respiratory symptoms to precordium pain and subcutaneous emphysema. With respect to pneumopericardium, clinical findings include mediastinal tympanism, pulsus paradoxus, jugular vein distention or alterations perceived during auscultation, findings that are not always present, making clinical suspicion and diagnostic guidance vital to reach an effective treatment. Therefore, imaging is fundamental; the imaging method of choice is chest X-ray, although, in the event of normal findings and high clinical suspicion, a chest CT should be performed.

The evolution of pneumomediastinum is generally benign and associated with a good prognosis, but taking into account that it is rare, it is important to rule out other pathologies that may trigger an unfavorable outcome in the patient.

ETHICAL CONSIDERATIONS

The authors state that no human or animal experiments were conducted for this research and that the workplace protocols on patient information management were followed.

This case report was approved by the ethics committee of Los Comuneros Hospital

Universitario de Bucaramanga S.A., by means of an unnumbered document dated May 22, 2018. The patient's mother authorized its publication in writing.

CONFLICT OF INTEREST

None stated by the authors.

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GIANT RIGHT CORONARY ARTERY ANEURYSM. CASE REPORT

Keywords: Coronary Aneurysm; Coronary Heart Disease; Chest Angina; Ischemia; Drug Induced Abnormalities.
Palabras clave: Aneurisma coronario; Enfermedad coronaria; Angina de pecho; Isquemia; Anomalías inducidas por medicamentos.

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RESUMEN

Introducción. La presentación de aneurismas coronarios es rara, sin embargo se asocian al abuso de drogas; su sintomatología depende de la anatomía coronaria. Se presenta el caso de un síndrome coronario agudo asociado a un aneurisma gigante de la arteria coronaria derecha.

Presentación del caso. Paciente masculino de 40 años con antecedente de consumo de heroína y crack desde los 20 años, quien consultó por disnea, angina estable y diaforesis. El electrocardiograma evidenció supradesnivel del segmento ST en cara inferior y elevación de troponinas, por lo que se realizó cateterismo coronario que reveló aparente fístula aorto-atrial derecha no concluyente. Dados los hallazgos, se decidió realizar angiotomografía y resonancia magnética que mostraron aneurisma gigante de arteria coronaria derecha. Se realizó resección de aneurisma con circulación extracorpórea, canulación femoral, hipotermia moderada, pinzamiento aórtico y cardioplejia, y se revascularizó la arteria coronaria derecha con vena safena interna izquierda. El paciente tuvo posoperatorio satisfactorio y se le dio de alta a los 7 días.

Conclusiones. El tamaño del aneurisma puede dificultar su diagnóstico, por lo que estudios complementarios son útiles para establecer un diagnóstico diferencial. El abordaje quirúrgico adecuado permite realizar una resección completa del aneurisma y una revascularización coronaria óptima.

ABSTRACT

Introduction: Coronary aneurysms are rare and are linked to drug abuse; symptomatology depends on the coronary anatomy. This is a case of acute coronary syndrome associated with a giant right coronary aneurysm.

Case description: A 40-year-old male, with history of heroin and crack use since age 20, attended consultation due to dyspnea, stable angina and diaphoresis. An electrocardiogram showed ST segment overlay on the underside and troponin problems. A coronary catheterization was performed, which revealed apparent inconclusive aorta-to-right atrium fistula. Based on the findings, angiotomography and magnetic resonance imaging were performed, finding a giant right coronary aneurysm. The aneurysm was resected using extracorporeal circuit, femoral cannulation, moderate hypothermia, aortic cross-clamping and cardioplegia, and the right coronary artery was revascularized with the left internal saphenous vein. The patient had a satisfactory postoperative period and was discharged after 7 days.

Conclusion: There is an important association between drug use and the development of coronary aneurysms. Aneurysm size makes diagnosis difficult, so complementary studies are necessary to establish a differential diagnosis. An appropriate surgical approach allows for a complete resection of the aneurysm and optimal coronary revascularization.

INTRODUCTION

According to Halapas *et al.* (1), a coronary artery aneurysm (CAA) is giant when its dilation exceeds the diameter of the patient's largest blood vessel by four times its normal size or when, according to Jha *et al.* (2), it has a diameter of 2 cm. The incidence of CAAs is estimated between 0.3% and 5%, while giant coronary artery aneurysms are found in only about 0.02% of the cases. (3)

CAA is classified as either congenital or acquired (atherosclerotic and non- atherosclerotic) (4) and may be associated with coronary fistulas. (5) Other conditions that can cause these aneurysms are vasculitis, Kawasaki disease, systemic lupus erythematosus, Lyme disease, trauma, drug abuse (such as cocaine), iatrogeny, and infections such as Epstein Barr virus and syphilis. (6,7) CAA formation as a result of cocaine use is often associated with severe episodic hypertension and vasoconstriction with a direct predisposition to endothelial damage. Likewise, aneurysmal disease may be related to underlying atherosclerosis. (8)

Most CAAs are asymptomatic, but up to one-third of cases may present with angina, myocardial infarction, sudden death, and congestive heart failure. (1)

Cardiac catheterization remains the gold standard for diagnosing CAAs. (9) However, CT angiography is a non-invasive, fast and relatively inexpensive technique, available in most health centers, which allows making 2D-3D anatomical reconstructions. (10)

The overall 5-year survival rate of patients with CAAs is 71% (8), but there is no strong evidence on treatment recommendations due to the lack of randomized control trials. Thus, establishing the need for medical treatment, implanting a stent or surgical exclusion of the CAA depends on the symptoms, etiology, and associated lesions. (1)

CASE PRESENTATION

A 40-year-old, mestizo, Mexican, middle-income businessman with a history of drug use for the last 20 years (heroin and crack) and no personal or family history of cardiovascular disease, attended consultation due to symptoms of 15 days of evolution characterized by dyspnea of medium effort, stable angina that did not respond to analgesics, and diaphoresis associated with his usual physical activity.

On physical examination, the patient was hemodynamically stable with no audible murmurs on auscultation. The electrocardiogram was consistent with inferior infarction, ST-segment depression of 0.5 mm, and positive measurement of troponin T. Therefore, the patient was successfully treated with thrombolysis and his symptoms resolved. Adequate criteria for reperfusion were obtained.

Coronary angiography was performed and the results suggested an inconclusive aorta-to-right atrium fistula. A coronary angiotomography and magnetic resonance imaging showed a giant aneurysm of the right coronary artery of 12.5x9.4x9.9cm in diameter, and ruled out aorta-to-right atrium fistula (Figures 1 and 2). Similarly, a transthoracic echocardiogram was performed, which revealed a 60% left ventricular ejection fraction with anterior wall akinesia, without altering the functioning of its valves.

Once the definitive diagnosis was established and based on the hemodynamic stability of the patient, it was decided to schedule the resection of the giant right coronary artery aneurysm plus coronary revascularization with saphenous venous graft.

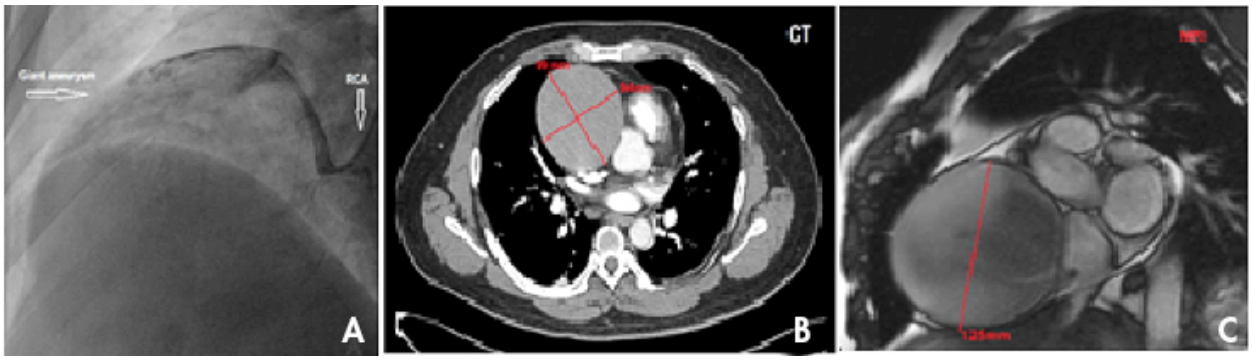

Figure 1. Imaging studies showing giant aneurysm of the right coronary artery A) Coronary Angiography; B) Axial Computed Angiotomography; C) Nuclear Magnetic Resonance.
Source: Document obtained during the study.

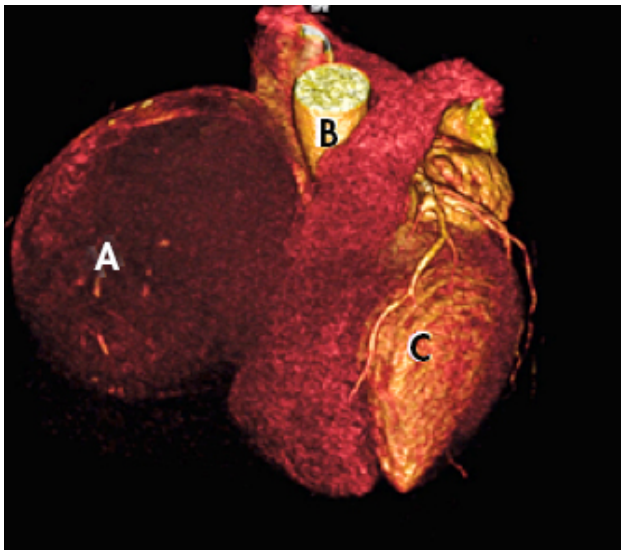

Figure 2. Tomographic reconstruction. A) Giant aneurysm of the right coronary artery; B) Aorta; C) Left ventricle.
Source: Document obtained during the study.

Surgical resection with femoral arterial and venous cannulation was chosen due to the large size of the aneurysm. Antegrade crystalloid cardioplegia solution was administered, the aneurysm was resected and the distal and proximal coronary lumen was properly closed with 4-0 polypropylene suture with Teflon® bands. Right coronary artery revascularization was performed with left saphenous vein graft and the edges of the aneurysm wall were sutured to avoid major bleeding. Adequate weaning of the extracorporeal circuit was completed and no complications were observed.

The patient was discharged 7 days after surgery without apparent enzymatic changes and with electrocardiogram and echocardiogram results without alterations (Figures 3, 4 and 5).

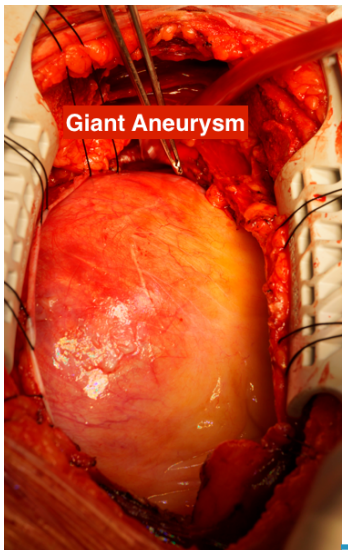

Figure 3. Surgical procedure: Giant aneurysm of the right coronary artery.
Source: Document obtained during the study.

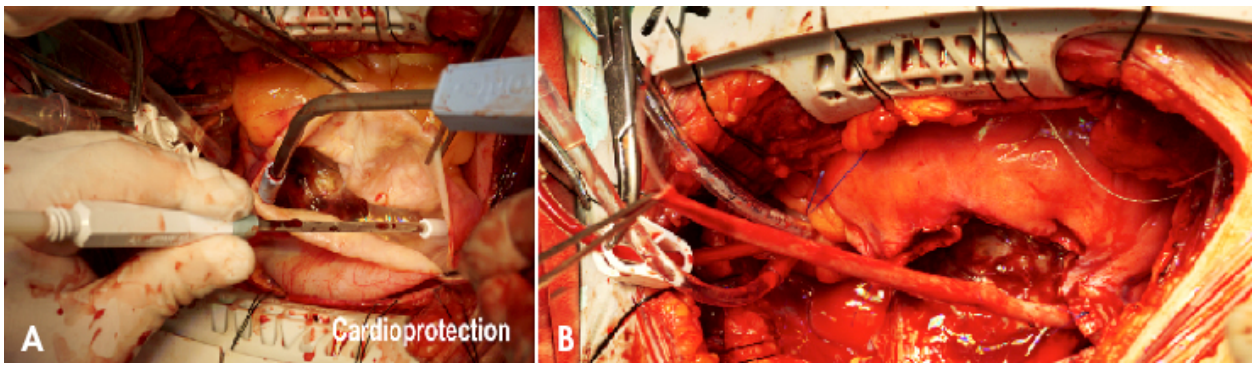

Figure 4. A) Resection of aneurysm of the right coronary artery. B). Right coronary artery revascularization
Source: Document obtained during the study.

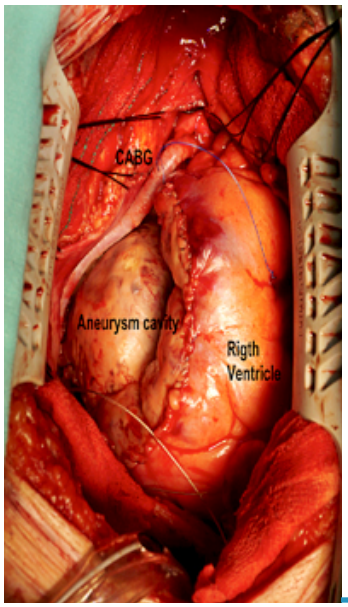

Figure 5. Outcome of surgical procedure
Source: Document obtained during the study.

DISCUSSION

A CAA is defined as "giant" when its size is bigger than 8mm or when it exceeds by 4 times the patient's largest blood vessel. This type of aneurysm is rare and may occur in 0.3-5% of patients undergoing coronary angiography. (2)

Satran *et al.* (8) report the correlation between coronary aneurysms and cocaine use and point to hypertensive episodes, vasoconstriction (which produces direct endothelial damage), accelerated atherosclerosis and related factors that increase the possibility of developing aneurysmal dilations as mechanisms involved in the development of this pathology.

The study by Mittleman *et al.* (11) was the first to demonstrate a significant increase in the risk of acute myocardial infarction in cocaine users. Cocaine is a drug that increases platelet aggregation and thrombosis and promotes transient erythrocytosis; in addition, its vasoconstrictive effects are found in both dysfunctional and histologically normal endothelium. (12-16)

The symptoms reported by this patient were ambiguous and possibly attributable to multiple pathologies related to the cardiovascular system. Therefore, it is essential to make a differential diagnosis that considers the following as possible causes: aneurysm of sinus of Valsalva, pseudoaneurysm of the aortic sinus and aneurysm of the right coronary artery, the latter being the definitive diagnosis in the present case. (9) The large size of the reported patient's CAA could have had a mechanical impact on the right heart chambers with a high probability of rupture, a fatal outcome, and ischemic effects due to turbulent flow and thrombosis that may be present in the aneurysmal sac secondary to blood stasis.

The natural history and prognosis of these patients are not clear because of the low prevalence of this entity, so diagnosis and management must be timely. Treatment of giant coronary artery aneurysms must take into account size, location, relationship to adjacent structures and hemodynamic involvement. Expectant medical treatment and stenting have been described as management techniques, and its surgical approach consists of ligation, ablation and myocardial revascularization.

CONCLUSIONS

The present case is of interest due to the large size of the aneurysmal sac, one of the largest reported in the literature; this is relevant since the aneurysm size can make its diagnosis difficult, so complementary studies are useful to establish a differential diagnosis. The clinical presentation of CAA is striking and leads to a large number of differential diagnoses, which can be excluded through complementary studies.

The surgical technique used to resolve the giant aneurysm of the right coronary artery in this case showed the basic characteristics for good exposure, cardiovascular protection, approach and resolution without complications.

ETHICAL CONSIDERATIONS

This article followed all the corresponding ethical standards for case reports, and informed consent was obtained in order to disclose the patient's information.

CONFLICT OF INTEREST

None stated by the authors.

FUNDING

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ASYSTOLE IN AN OLDER PATIENT WITH RECURRENT FALLS. CASE REPORT

Keywords: Syncope; Asystole; Pacemaker, Artificial; Sinus Arrest, Cardiac.
Palabras clave: Síncope; Asistolia; Marcapasos artificial; Paro sinusal cardíaco.

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RESUMEN

Introducción. Las caídas frecuentes son un problema común en pacientes de la tercera y la cuarta edad, por tanto es importante saber diferenciar cuando se trata de un evento patológico o sincopal, y cuando es un simple tropiezo, sobre todo en pacientes que tienen limitaciones para comunicarse de forma clara y son poco entendidos en términos generales durante la consulta médica. Los monitores de eventos cardiacos pueden ser usados en casos seleccionados de caídas frecuentes en adultos mayores para determinar las posibles causas de estos eventos, por lo que el presente reporte de caso pretende mostrar cuál es su utilidad en un paciente con caídas no sincopales a repetición.

Presentación del caso. Paciente femenina de 87 años, hipertensa, con evento cerebrovascular reciente e historia de caídas a repetición referidas como tropiezos, a quien se le implantó un dispositivo diagnóstico de fibrilación auricular. En uno de los controles se observó pausa de 36 segundos relacionada con episodio de caída, por lo que se implantó un marcapasos bicameral.

Conclusiones. La evaluación de caídas a repetición en pacientes mayores es compleja y debe realizarse de forma detallada para descartar síncope. El uso de monitores de eventos cardiacos para la identificación de causas arrítmicas de estos eventos permite diagnósticos certeros, con lo que a su vez es posible establecer tratamientos específicos que mejoren la calidad de vida de los pacientes.

ABSTRACT

Introduction: Recurrent falls are a usual problem in older patients. It is therefore important to learn how to differentiate a pathological or syncopal episode from a simple stumbling fall, especially in patients who have limitations for communicating clearly and are poorly understood, in general terms, during the medical consultation. Implantable loop recorders (ILR) have been used as an investigation tool in selected cases of recurrent falls in older patients. Consequently, this case report aims to describe its usefulness in this type of patients.

Case presentation: An 87-year-old female patient, hypertensive, with a history of recent stroke and frequent falls —referred to as stumbling—, received an implantable loop recorder due to atrial fibrillation. During one follow-up appointment, a 36-second pause related to a fall was documented, so a bicameral pacemaker was implanted.

Conclusions: Evaluating repeated falls in older patients is complex; it must be done in detail to rule out syncopal episodes. Implantable devices to diagnose arrhythmic causes are useful and allow achieving accurate diagnoses and establish specific behaviors aimed at improving the quality of life of patients.

INTRODUCTION

Falls are a common problem among patients over 60 years of age and are caused by multiple reasons; therefore, it has been necessary to implement specific protocols aimed at managing this problem, which include scales for predicting falls, and study and management protocols. (1) Novel strategies such as implantable loop recorders (ILR) are available and are being used more frequently. However, according to some authors, there is uncertainty about the benefit of implanting high-voltage devices in patients over 70 years of age to reduce their risk of mortality and improve their quality of life, given that there is insufficient representation of this population in the available clinical studies. (2)

ILR have become valuable diagnostic tools for heart rhythm disorders that cannot be adequately recorded on a surface electrocardiogram or 24/48-hour Holter monitoring study. They have been proposed for patients who experience >1 episode every 15 days and patients with cryptogenic stroke under study for atrial fibrillation, showing a sensitivity of 100% and specificity up to 97%. They can also be used as complementary tools to electrophysiological test or head-up tilt table test in patients with a history of syncope. (3-6) Furthermore, these devices have been used to monitor older patients with frequent falls in whom the mechanism has not been established. (7,8)

CASE PRESENTATION

An 87-year-old female self-reliant low–income patient from the rural area of Caldas, Colombia, attended consultation due to a fall without loss of consciousness in her home with transitory alteration of the language. There was no evidence of orthostatic hypotension on admission, and a history of hypertension and thyroid hormone replacement therapy was reported. The fall was interpreted as a neurological event: transient ischemic attack.

During a hospital stay, the patient presented normal ventricular function according to a transthoracic echocardiogram, brain scan without acute lesions, carotid Doppler without significant stenosis or unstable lesions, surface electrocardiogram in sinus rhythm, and 24-hour Holter study without evidence of atrial fibrillation, pauses or bradyarrhythmias. Implanting a heart monitor was proposed in order to find atrial fibrillation; the device was implanted in the fifth intercostal space at the left sternal border at a 45-degree angle under local anesthesia and percutaneously, without incisions or sutures.

The first surgical follow-up visit took place 30 days after the procedure. The patient attended the appointment in the company of a granddaughter, who reported having activated the device due to multiple trips and falls without frank loss of postural tone. The data retrieved from the Confirm RX® device (St. Jude Medical, Figure 1) was analyzed and multiple sinus pauses were observed —the longest lasted 36 seconds—, so a new admission for a bicameral pacemaker implant was ordered. This procedure was performed by dissecting the cephalic vein with insertion of electrodes to the septal and apical region of the right ventricle and the right atrium; there were no complications (Figure 2).

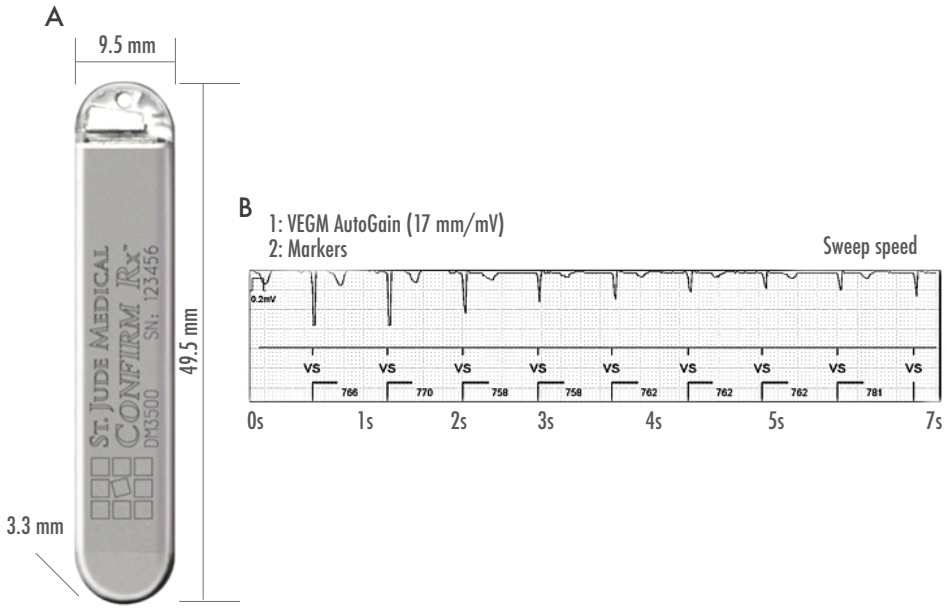

Figure 1: A) Insertable cardiac monitor Confirm Rx®; B) 7-second recording fragment recovered from the event monitor.

Source: Document obtained during the study.

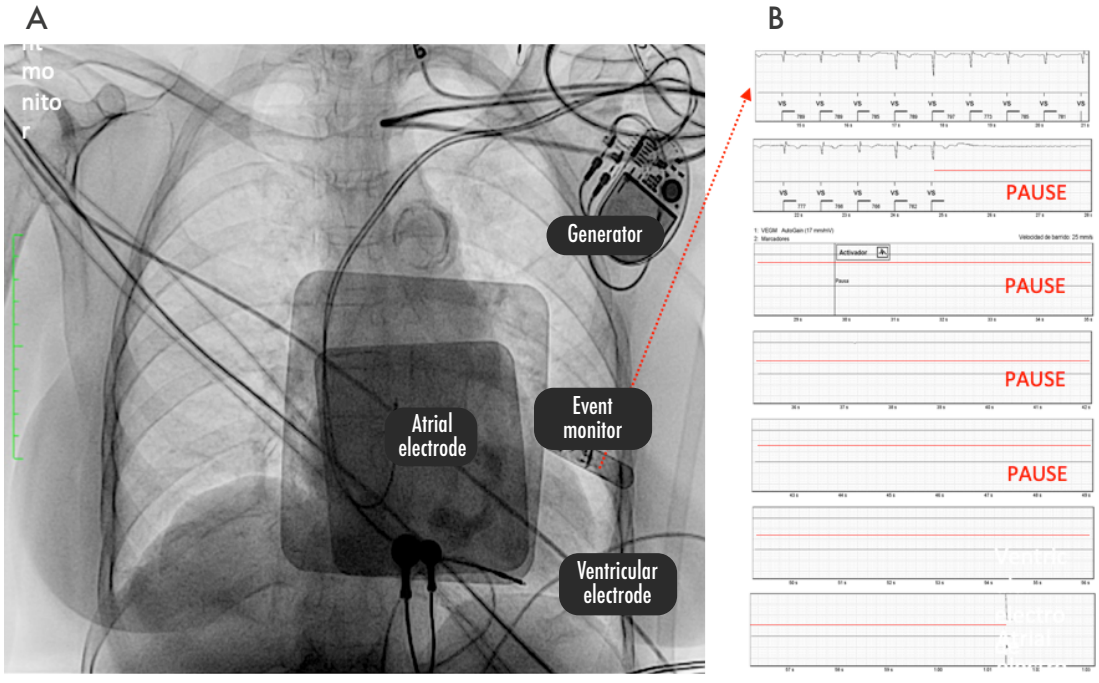

Figure 2. A) Anterior-posterior plane showing bicameral pacemaker and cardiac event monitor; B) Monitor recording with 36-second pause.

Source: Document obtained during the study.

DISCUSSION

Up to 40% of strokes have no specific cause. However, this study found that monitoring using ILR was better than conventional tools to identify atrial fibrillation, the leading cause of stroke. (9)

Fall episodes in older adults are common, dangerous and underestimated in some clinical settings. The highest frequency of falls is reported in patients over 80 years of age, with figures of up to 36%. (10) Therefore, establishing the correct cause of a fall is a clinical challenge considering that there may be one or multiple causes including dementia, gait abnormalities, weakness, sarcopenia, medications and arrhythmias (bradyarrhythmias and tachyarrhythmias). (10)

When non-invasive diagnostic studies are performed, identifying sinus arrest as the cause of syncope is a challenging task; however, it can be recognized for being a long and sudden pause not preceded by a p wave and twice as long as the preceding P-P interval. Episodes of asystole, pulseless electrical activity, ventricular fibrillation and pulseless ventricular tachycardia are actually rhythms associated with cardiac arrest, so management requires adherence to cardiopulmonary resuscitation protocols. In countries such as the United States, estimates are that there are 290 000 cases of cardiac arrest every year, of which up to 88% are related to asystole or pulseless electrical activity. (11)

The use of state-of-the-art percutaneously inserted ILR with minimal risk of infection (almost non-existent) allows identifying heart rhythm disorders in between 14% and 40% of cases related to recurrent falls of unknown origin. (12,13) Bhangu et al. (7) conducted a study using ILR in 70 patients aged 51-85 years with recurrent falls and syncope, and reported that the use of these devices allowed them to implant bicameral bradyarrhythmia pacemakers in 14% of cases and perform supraventricular tachycardia ablation in 4%. Moreover, the authors noted that ILR allowed them to recognize 71.4% of arrhythmia episodes and 20% of arrhythmias related to recurrent falls, identifying 8% of patients with bradycardia <40 bpm, 44% with bradycardia between 40 and 60 bpm, 30% with supraventricular tachycardia, and up to 18% with asystole >3 seconds. (7)

Unexpected heart rhythm disorders in patients over 80 years of age are of clinical interest and radically change treatment behaviors. In this regard, some studies have reported cases in which diagnosis was achieved based on the analysis of ILR records, finding that up to 44% of syncopes of unknown cause were attributed to arrhythmias. This allows establishing specific treatments in order to reduce mortality, which in these patients is close to 32% at the time of diagnosis. (14-16)

The benefit of using ILR has been widely studied. Ryan et al. (17) analyzed their utility in other types of pathologies such as carotid sinus hypersensitivity in fourth age patients by means of multicenter, double-blind and randomized designs in a limited sample; however they did not obtain conclusive results. On the other hand, Maggi *et al.* (18) investigated their use in patients with non-syncopal loss of consciousness and found that ILR recorded asystole >6 seconds in 26% of the cases.

Based on the observations in this case report, ILR should be routinely used in older patients with unexplained falls, as this intervention allows elucidating heart rhythm disorders that can be treated and, thus, improve their quality of life. In the case of arrhythmias, the use of these devices would allow avoiding fatal outcomes and prolonged hospitalization stays due to repeated falls, as well as improving the day-to-day life of these patients.

One limitation of this study was the lack of other exploratory diagnostic studies, since they were not considered necessary by any of the specialties that treated the patient. However, it should be noted that although evidence on the use of ILR in people aged 80 years or above is limited and not conclusive, in this case the device was useful for the resolution of a problem frequently found in clinical practice.

CONCLUSIONS

Since recurrent falls and syncope have a multifactorial component, in older adults the presence of arrhythmias (bradyarrhythmias and asystole or tachyarrhythmias) should be considered as a possible cause of these events.

The use of diagnostic tools such as ILR allows the patients and their relatives to correlate the symptoms with the heart rhythm at the time of the event, which can help clinicians make appropriate and accurate decisions for the treatment of recurrent falls of cardiac origin or syncope of unknown cause in older people.

ETHICAL CONSIDERATIONS

This work is considered as a non-intervention. The patient was asked for authorization to disclose her clinical information, and her privacy was maintained during and after the preparation of the document.

CONFLICT OF INTERESTS

None stated by the author.

FUNDING

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