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Case Report

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Renal Hydatidosis

Maiko Alejandro Tavera Díaz[1], Edgar Fernando García Torrez[2], Alexander García Romero[3], Wualdo Torrez Morales[3], Yolanda Canqui Condori[4], Lorena Rivera Talavera[5], Greby Fernando Zambrana Balta[6], Hans Alexander Ferreira Villa[7], Annia Aguilar Loayza[8], Camila Pérez Herrera[8], Oscar Tejada Ferrufino[9], María del Pilar Ruiz Ostria[9]

Abstract

Renal hydatidosis is a rare manifestation of echinococcal disease, accounting for only 2-3% of all hydatid infections. We present the case of a 21-year-old female with no typical risk factors who presented with a large renal hydatid cyst. The patient reported a four-month history of progressive abdominal distension in the right hypochondrium extending to the right flank, accompanied by oppressive pain, nausea, vomiting, fatigue, anorexia, and weight loss. Imaging studies confirmed a large renal hydatid cyst in the upper pole of the right kidney. The patient underwent preoperative treatment with albendazole followed by successful surgical management with partial nephrectomy and cyst enucleation. This case highlights the importance of considering hydatid disease in the differential diagnosis of cystic renal masses, even in patients without typical epidemiological risk factors, and demonstrates the efficacy of a combined medical and surgical approach.

Keywords: Renal hydatidosis; Hydatid cyst; Echinococcus granulosus; Imaging diagnosis; Surgical treatment.

Introduction

Hydatidosis is a zoonotic parasitic disease caused by the larval stage of the cestode Echinococcus granulosus. While hydatid disease primarily affects the liver (55-70%) and lungs (18-35%), renal involvement is uncommon, representing only 2-3% of all cases. Renal hydatid cysts develop when the parasite embryos bypass the hepatic and pulmonary filters and reach the kidneys through arterial circulation. This parasitosis remains endemic in many regions worldwide, particularly in livestock-raising areas of South America, the Mediterranean basin, Central Asia, and North Africa. The clinical presentation of renal hydatidosis is often nonspecific, which can lead to diagnostic delays. Patients may present with flank pain, palpable mass, hematuria, or, in pathognomonic cases, hydatiduria (passage of cyst elements in urine). Imaging studies, particularly ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI), play a crucial role in diagnosis, while serological tests provide complementary information. Treatment approaches include medical therapy with benzimidazoles, minimally invasive procedures, and surgical interventions. The choice of treatment depends on cyst characteristics, patient factors, and available expertise [1, 2]. We present a case of renal hydatidosis in a young female patient without typical epidemiological risk factors, highlighting the diagnostic challenges and management strategies for this uncommon presentation.

Affiliation:

[1]Department of Nephrology, Univalle Hospital, Cochabamba, Bolivia

[2]Department of Urology, Univalle Hospital, Cochabamba, Bolivia

[3]Department of General Surgery, Univalle Hospital, Cochabamba, Bolivia

[4]Department of Pathological Anatomy, Univalle Hospital, Cochabamba, Bolivia

[5]Department of Infectology, Univalle Hospital, Cochabamba, Bolivia

[6]Department of Imagenology, Univalle Hospital, Cochabamba, Bolivia

[7]Department of Internal Medicine, Univalle Hospital, Cochabamba, Bolivia

[8]Medical Doctor, Univalle Hospital, Cochabamba, Bolivia

[9]Chief Medical Officer, Univalle Hospital, Cochabamba, Bolivia

***Corresponding author:**
Dr. Maiko Alejandro Tavera Díaz. Department of Nephrology, Univalle Hospital, Cochabamba, Bolivia.

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Case Presentation

A 21-year-old female with no significant medical history or typical risk factors for hydatid disease presented to the gastroenterology department with a four-month history of progressive abdominal distension in the right hypochondrium. The patient reported that the swelling had extended to the right flank over the previous two months, accompanied by oppressive pain, nausea with multiple episodes of vomiting, fever, fatigue, weakness, anorexia, and weight loss of 4 kg in the last month. On admission, the patient's vital signs were within normal parameters. Physical examination revealed a conscious, alert patient with a palpable, tender abdominal mass measuring approximately 15 cm wide and 21 cm long, extending from the right hypochondrium to the right flank, with dullness to percussion. The remaining abdominal quadrants were soft and non-tender, with normal active bowel sounds. Laboratory tests were within normal limits. Abdominal ultrasonography showed a large cystic lesion in the right upper quadrant with mass effect. Contrast-enhanced abdominal CT demonstrated a large cystic mass in the upper pole of the right kidney (Figure 1). Further evaluation with contrast-enhanced abdominal MRI revealed a well-defined cystic lesion in the upper pole of the right kidney, extending in a craniocaudal direction. The lesion appeared hyperintense on T2-weighted images and hypointense on T1-weighted images, with areas of heterogeneity suggesting floating internal membranas a characteristic finding in hydatid cysts. No enhancement was observed after contrast administration, and mass effect with compression of surrounding structures was evident (Figure 2).

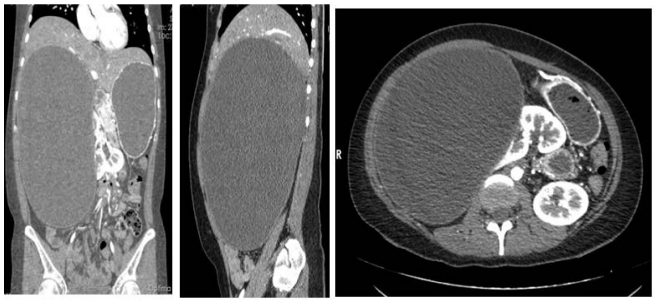

Figure 1: Contrast-enhanced abdominal CT in coronal, sagital, and axial planes. A large hypodense cystic lesion with well-defined contours and thin walls is identified in the upper pole of the right kidney.

Based on the imaging findings, a diagnosis of renal hydatid cyst was established. The patient was treated with oral albendazole 400 mg twice daily for 10 days preoperatively, followed by surgical intervention consisting of total nephrectomy with cyst enucleation (Figure 3). The procedure was performed successfully without complications. The histopathological report shows a hydatid cyst composed of an acellular chitinous anhista layer lined internally by a germinative layer with signs of activity and towards the periphery a delicate and congestive adventitial layer. Sections of the kidney show cortex with atrophic changes and chronic inflammatory infiltrate. Calyces, pelvis and ureter lined by reactive urothelium (Figure 4). The patient had an uneventful postoperative course and was discharged with instructions for outpatient follow-up.

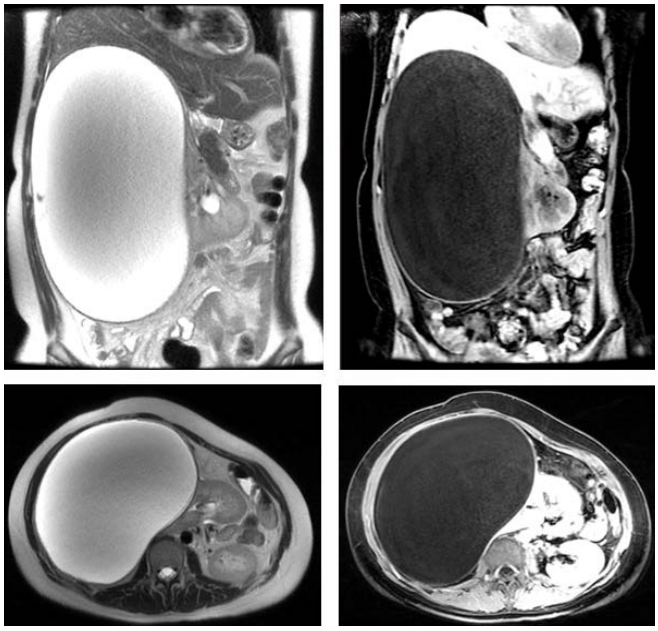

Figure 2: Contrast-enhanced abdominal MRI in coronal and axial planes. A well- defined large cystic lesion located in the upper pole of the right kidney, extending in a craniocaudal direction. The cyst content appears predominantly hyperintense on T2- weighted images and hypointense on T1-weighted images, with heterogeneous areas associated with the presence of floating internal membranes—a characteristic finding of hydatid cysts. No enhancement is observed after contrast administration. Mass effect with compression of surrounding structures is evident.

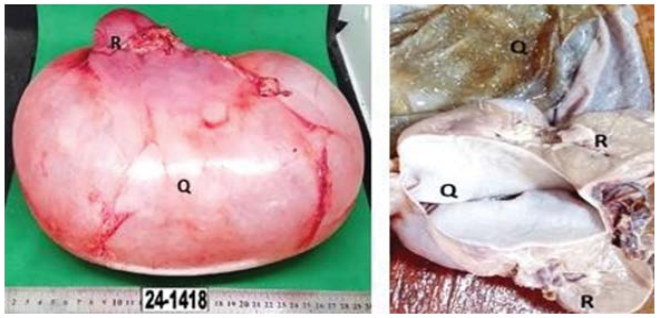

Figure 3: Right nephrectomy with a cyst weighing 4975 g. The kidney (R) measuring 13 x 6 x 6 x 6 cm with a smooth surface with signs of extrinsic compression and congestive cortex with mild atrophic changes is identified. The cyst (Q) measures 28 x 20 x 20 x 20 cm, shows an elastic wall 0.2 to 0.4 cm thick with a smooth external surface, its lumen contains citrine liquid and its internal surface is whitish granular.

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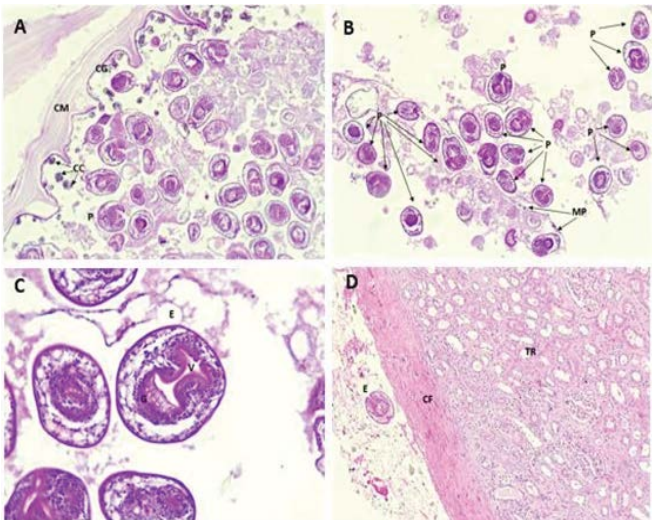

Figure 4: Microscopic examination HE 20X. A) Multilamellar layer (CM), germinative layer (CG), proto-scolex (P) and calcareous corpuscles (CC). B) Protoscolex (P), Proliferous membrane (MP). C) Scolex (E) with sucker (V) and hooks (G) 40X. D) Scolex (E), fibrous cap (CF) and renal tissue (TR) 20X.

Discussion

Epidemiology

Hydatidosis demonstrates significant geographic heterogeneity with well- identified hyperendemic foci. The Mediterranean basin records prevalence rates between 3-10 cases per 100,000 inhabitants, with Greece (3.7/100,000), Spain (4-7/100,000), and Italy (3.3/100,000) being particularly affected. The Middle East and Central Asia constitute another significant region, where Turkey reports 6.4/100,000 and Kyrgyzstan reaches alarming figures of 13-20/100,000. South America is a priority focus, particularly in Argentina (9/100,000), Chile (7-8.4/100,000), and Peru (7-11/100,000). North Africa, especially Tunisia, maintains high rates (12.6/100,000), while Oceania has localized foci in rural Australian areas (2-5/100,000) [3, 4]. Bolivia constitutes an endemic territory with particular characteristics that favor the persistence of the parasitic cycle. The Bolivian Altiplano (>3000 meters above sea level) records prevalence rates of 20-32/100,000 inhabitants, a figure that increases in specific livestock areas up to 34-41/100,000. The western departments, particularly La Paz, Oruro, and Potosí, concentrate the highest disease burden [5-7]. The global epidemiological trend shows divergent patterns. Multiple converging factors explain this situation: a sheep population exceeding 7 million, parasite prevalence in dogs between 14-27%, uncontrolled domestic slaughtering (>60% in rural areas), and a fragile epidemiological surveillance system that captures only 30-40% of actual cases. Late diagnosis represents another critical element, with an average of 2.3 years from symptom onset to diagnostic confirmation [8-10].

Risk Factors

The multifactorial etiological analysis identifies environmental, sociocultural, and health determinants. Environmental factors include temperate climates favorable for prolonged egg survival, rural areas with extensive livestock farming, and altitudes above 2500 meters. Sociocultural factors include close human-dog-livestock coexistence, traditional home slaughtering practices without veterinary supervision, and feeding raw infected viscera to canines [11, 12]. Health determinants include the absence of sustainable control programs, limited epidemiological surveillance, restricted access to specialized diagnosis, and lack of standardized canine deworming protocols. The convergence of these factors explains the persistence of the parasitic cycle even in contexts of intermediate socioeconomic development [13, 14].

Pathogenesis

The pathogenic sequence begins with the ingestion of eggs that release hexacanth embryos (oncospheres) in the small intestine. These structures penetrate the intestinal mucosa, access portal/lymphatic circulation, and primarily reach the liver (first filter) and lungs (second filter). Embryos that bypass these filters can potentially localize in any tissue [15, 16]. Parasitic establishment generates the characteristic cystic formation with three layers: adventitia (pericyst) consisting of the host's fibrotic reaction; laminar (ectocyst), acellular and produced by the parasite; and germinal (endocyst), metabolically active and responsible for protoscolex production. The slow expansive growth (1-5mm/year) explains the frequent prolonged clinical latency [17, 18]. Pathogenic complications include cyst rupture with anaphylactic risk and secondary seeding, infection with abscess formation, compression of adjacent structures, and fistulization to neighboring structures, particularly bile ducts in hepatic localization [19, 20].

Organs Affected and Clinical Manifestations

The organ distribution shows hepatic predominance (55-70%), followed by pulmonary localization (18-35%). Other locations include spleen (5-8%), kidney (2-3%), brain (2%), heart (0.5-2%), bone (1%), and muscle (<1%). This distribution reflects the hematogenous dissemination route and successive vascular filters [21, 22]. Clinical presentation varies according to location, size, and cyst status. Hepatic involvement primarily manifests with abdominal pain (87%), hepatomegaly (76%), jaundice (13%), nausea/vomiting (36%), and fever (22%). Pulmonary localization produces cough (72%), chest pain (49%), dyspnea (42%), hemoptysis (25%), and, characteristically, hydatid expectoration (20%) [23, 24].

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Renal Hydatidosis

Renal localization represents 2-3% of cases, with notable particularities. Its arrival occurs exclusively via arterial route after bypassing hepatic and pulmonary barriers. The predominant location is the upper pole (62%), with slower growth than in other sites (0.5-2cm/year) [25, 26]. The clinical presentation includes lumbar pain (68%), palpable mass (35%), hematuria (18%), pathognomonic hydatiduria (12%), renal colic (9%), and fever (5%). Specific complications include rupture into the collecting system (8-10%), renal exclusion (4%), pyonephrosis (3%), and abscess formation (9%) [27, 28]. This localization represents a particular diagnostic challenge due to its similarity with other urological pathologies, requiring a high index of suspicion in endemic areas. The low pretest probability explains the frequent diagnostic delay in this localization [29, 30].

Diagnostic Methods

The diagnostic approach integrates imaging studies, serological tests, and, occasionally, analysis of biological samples. Ultrasonography constitutes an ideal initial tool with 93- 98% sensitivity, 90% specificity, and 0.94 AUC. Its advantages include accessibility, safety, and classification possibility (Gharbi/WHO) [31, 32]. Computed tomography offers greater precision (95-100% sensitivity, 95-100% specificity, 0.98 AUC) with superior anatomical definition, calcification detection, and surgical planning capabilities. Magnetic resonance imaging (92-97% sensitivity, 97% specificity, 0.96 AUC) excels in identifying biliary communications and evaluating complex localizations [33, 34]. For renal hydatidosis, specific studies include excretory urography (67% sensitivity), renal ultrasound (85% sensitivity), and renal CT (98% sensitivity) [35, 36]. Serological tests constitute a fundamental complement. ELISA shows variable sensitivity according to location (80-100% hepatic, 65-95% pulmonary, 60-85% renal) with 88-96% specificity. Immunofluorescence (95% sensitivity, 85-95% specificity) and Western Blot (91-96% sensitivity, 95-100% specificity) provide confirmation in complex cases [37, 38]. Renal hydatidosis presents particular serological behavior with lower sensitivity (60- 85%), higher false-negative rate (25%), and lower titers even in active disease, explainable by reduced antigenic exposure to the immune system [39, 40].

Treatment

The contemporary therapeutic approach requires individualization according to patient and cyst characteristics. Pharmacological treatment with benzimidazoles, particularly albendazole (10-15 mg/kg/day in two doses), achieves complete response in 30%, partial response in 30-50%, and no response in 20-40%. Its indications include small cysts (<5cm), multiple cysts, inoperable cases, or as perioperative adjuvant therapy [41, 42]. Percutaneous treatment using the PAIR technique (Puncture, Aspiration, Injection, Reaspiration) achieves technical success in 75-95% with 1.6-4% recurrence. Its indications include CE1-CE2 type cysts not communicating with bile ducts and patients with surgical contraindications [43, 44]. Surgical treatment includes conservative techniques such as partial cystectomy (85-95% technical success, 10-25% recurrence, 0.9-2.5% mortality) and marsupialization.

Radical techniques encompass total pericystectomy (90-98% technical success, 2-5% recurrence, 1.5-3.6% mortality) and hepatic resection. The laparoscopic approach offers advantages in selected cases despite the potential risk of peritoneal dissemination [45, 46]. For renal hydatidosis, options include conservative treatment through renal cystectomy (parenchymal preservation, 15-20% complications) and radical treatment with partial or total nephrectomy. The latter is indicated for giant cysts (>10cm), multiple cysts, non- functioning kidney, or secondary pyonephrosis, representing 25-30% of interventions. The renal laparoscopic approach shows increasing feasibility under strict selection criterio [47, 48].

Prognosis

Prognostic evolution varies according to multiple variables. Determining factors include location (better in pulmonary, intermediate in hepatic), cyst size (<5cm favorable), therapeutic modality (superior results with multimodal approach), and comorbidities [49, 50]. Overall survival reaches 88-95% at five years and 80-88% at ten years. Recurrence varies according to treatment: 11.3% post-surgery, 4.2% post-PAIR, and 14-25% post- exclusive medical treatment at five years. Late complications include residual cysts (5- 15%), chronic biliary fistulas (3-8%), and recurrent cholangitis (4-7%) [51, 52]. Renal hydatidosis shows a relatively favorable prognosis with renal preservation in 70- 75% of cases, recurrence of 2-8% (lower than hepatic localization), late complications in 10-15%, and specific mortality less than 1% [53, 54].

Conclusion

Hydatidosis continues to represent a significant global health challenge, particularly in Bolivia and regions with similar epidemiological conditions. Its approach requires integrated strategies that contemplate robust epidemiological surveillance, sustainable veterinary control programs, health education in endemic communities, and equitable access to diagnosis and treatment [55, 56]. Renal hydatidosis, although relatively infrequent, exemplifies the diagnostic complexity of atypical localizations and the need to maintain a high index of suspicion in endemic areas. The favorable prognosis in appropriately diagnosed and treated cases underscores the importance of timely intervention based on updated scientific

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evidence [57, 58]. Our case highlights several important features: the occurrence of renal hydatidosis in a young patient without typical risk factors, the characteristic imaging findings that led to diagnosis, and the successful outcome with combined medical and surgical management. This case reinforces the importance of including hydatid disease in the differential diagnosis of renal cystic masses, particularly in regions where this parasitosis is endemic.

Declarations

Declaration of Conflicting Interests

The authors have no conflicts of interest to declare regarding the research, authorship, and/or publication of this article.

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