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Editorial

Surgical and Anesthesiologic Perspectives on Modern Treatment Approaches of Liver Hydatid Cysts: Surgeon and Anesthesiologist Point of View

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Introduction

Liver hydatid cysts (LHCs), caused by Echinococcus granulosus, remain a significant global health concern, particularly in endemic regions (1). The estimated prevalence of hydatid disease varies, reaching up to 8% in some Mediterranean countries, with recurrence rates post-surgery ranging between 2% and 25% depending on the technique used (2). Over the years, we have accumulated significant experience in the surgical management of LHCs, focusing on innovative diagnostic approaches, surgical techniques, and collaborative strategies with anesthesiologists to optimize patient outcomes (2).

This editorial explored the evolving perspectives on surgical management, the role of minimally invasive techniques, and the critical aspects of analgesia and anesthesiology in optimizing patient outcomes, focusing on the public health challenges specific to Tunisia.

Public health importance in Tunisia

A national epidemiological study reported a prevalence of 5.6 cases per 100,000 inhabitants, with a significant proportion of patients presenting late due to healthcare access disparities (3–5). In Tunisia, LHCs are a persistent public health problem, particularly in rural and agricultural regions, where close contact with livestock and domestic dogs facilitates the life cycle of Echinococcus granulosus (6). The high prevalence of this disease reflects gaps in public health education, inadequate veterinary control measures, and limited access to healthcare services in remote areas (7). Despite government initiatives aimed at controlling zoonotic diseases, the cultural and economic importance of livestock farming perpetuates endemicity (8). In addition, delays in diagnosis and treatment are common, especially in underserved regions (8). Many patients are present with advanced or complicated cysts, increasing the burden on healthcare systems (3–5).

Addressing this problem requires a multidisciplinary approach, including public health campaigns, improved veterinary practices, and access to diagnostic and therapeutic facilities.

Surgical perspectives

One of the critical aspects of LHC management is the precise diagnosis, especially in challenging anatomical locations such as the hepatic dome (9). The analysis of imaging features has emphasized the role of clinical, biological, and radiological integration to avoid misdiagnoses and guide surgical planning effectively (10). Furthermore, we have explored the challenges posed by atypical presentations, including misinterpretations of imaging findings (11).

The management of LHCs has changed from traditional open surgery to less invasive approaches, including laparoscopic and robotic-assisted techniques (12). Meta-analyses comparing laparoscopic and open procedures have demonstrated that minimally invasive approaches reduce postoperative pain, hospital stays, and recovery times, with complication rates ranging from 5% to 15% (13–16). However, they require specialized training and careful patient selection to mitigate risks such as cyst rupture and the dissemination of hydatid disease, and there are no promising trends in the laparoscopic approach (17). In Tunisia, the limited availability of advanced surgical equipment poses challenges to the widespread adoption of minimally invasive techniques and intraoperative exploration (17). Radial surgeries, such as total cystectomy, remain the gold standard for large or complicated cysts (18). A 10-year multicentric study in the Maghreb region found that radical surgeries reduced recurrence rates to below 5%, compared to 20% with conservative approaches (17).

However, conservative surgeries combined with chemical sterilization are validated alternatives for specific cases (19). The choice of surgical technique should be customized based on the location, size, and the patient's overall health.

We have been involved in evaluating and implementing surgical techniques tailored to the cyst's size, location, and associated complications (4). The different experiences in both emergency and elective settings have shown that timely intervention preferably within the first 24 hours for ruptured cysts can significantly improve outcomes (4,20). Managing LHCs, particularly in high-risk cases, demands seamless collaboration between the surgical and anesthesiology teams (21,22). We underlined the importance of anesthetic protocols tailored for cystic liver diseases, addressing concerns such as potential cyst rupture, anaphylactic reactions, and perioperative fluid management (21). Collaborative perioperative planning has emerged as a cornerstone of successful interventions in my experience (5,20).

In addition, beyond clinical practice, we have been committed to disseminating knowledge and best practices for LHC management (8). This could be achieved through training workshops, clinical case discussions, and interdisciplinary conferences focusing on optimizing patient outcomes and minimizing complications.

Anesthesiologic perspectives

LHC surgeries represent a convergence of surgical and anesthetic intricacies, presenting unique challenges that necessitate a nuanced approach from the anesthesiology team (23). At the forefront of these challenges lies the risk of anaphylactic reactions stemming from cyst rupture, a complication with potentially life-threatening implications which could occur in 2% - 7% of cases (24). This necessitates meticulous preoperative preparation, intraoperative vigilance, and immediate access to resuscitative measures (10). Although the anesthesiologic management of LHC surgeries demands a blend of vigilance, technical expertise, and adaptability (25). By prioritizing comprehensive preoperative evaluations, leveraging the benefits of regional anesthesia, and implementing multimodal analgesia protocols, anesthesiologists can optimize outcomes and enhance recovery (26,27). Addressing systemic disparities in healthcare access remains an ongoing challenge, but with targeted efforts, the promise of equitable anesthetic care can become a reality for all patients.

Preoperative considerations

The cornerstone of successful anesthetic management begins with a comprehensive preoperative evaluation. Patients often present with varying degrees of cardiovascular and respiratory compromise due to cyst-induced compression of surrounding structures (28). Imaging studies such as computed tomography scans or magnetic resonance imaging, coupled with functional assessments, are essential to delineate the extent of compression and identify concomitant conditions (29). The anesthesiologist must account for these factors when formulating an anesthetic plan, ensuring optimal hemodynamic stability and oxygenation throughout the perioperative period.

Regional anesthesia as a vital adjunct

The role of regional anesthesia in LHC surgeries has gained traction, particularly thoracic epidural analgesia (2). When used in conjunction with general anesthesia, thoracic epidurals provide superior postoperative pain control, improve pulmonary function, and facilitate earlier mobilization (2,30,31). These benefits are especially significant in patients with compromised respiratory mechanics due to cyst-related compression

(31). Moreover, regional techniques align with the principles of enhanced recovery after surgery (ERAS) protocols, which prioritize multimodal analgesia to reduce opioid consumption and its associated adverse effects (2).

Multimodal analgesia for optimizing outcomes

Incorporating multimodal analgesia protocols is pivotal in optimal pain management (26). The judicious combination of local anesthetics, opioids, and adjuvants such as dexmedetomidine and magnesium sulfate provides synergistic analgesic effects while mitigating opioid-related side effects like respiratory depression and delayed gastrointestinal recovery (32,33). These protocols necessitate precise titration and monitoring, underscoring the need for anesthesiologists' expertise.

Future Directions and Research Perspectives

Advancements in imaging technologies, such as artificial intelligence-assisted diagnostics, may improve preoperative risk stratification and surgical planning in LHCs. Furthermore, research on robotic-assisted hydatid cyst surgery is ongoing, with preliminary data suggesting its feasibility in select cases (34,35).

From a public health perspective, implementing systematic screening programs in endemic areas could facilitate early detection and intervention, reducing complications and healthcare burdens. Future research should focus on cost-effective strategies to integrate these technologies into low-resource settings.

Conclusions

Managing LHCs requires a multidisciplinary approach that involves surgeons and anesthesiologists. Advances in surgical techniques and anesthetic protocols have significantly improved patient outcomes, but challenges remain to address complex cases and minimize recurrence. In Tunisia, the persistence of LHCs as a public health problem underscores the need for targeted interventions, including improved public health education, healthcare infrastructure, and strengthened veterinary controls.

We call on the medical community and policymakers to prioritize research and resource allocation to combat this disease effectively. Together, we can pave the way for more effective and safer treatment modalities, ultimately enhancing patient outcomes and reducing the burden of liver hydatid cysts in Tunisia and beyond.

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