



UNIVERSITATEA
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Doctoral School of Medicine

Field of Doctorate: Medicine

SUMMARY OF THE DOCTORAL THESIS

PARTICULARITIES OF MINIMALLY INVASIVE TREATMENT IN THE SURGICAL MANAGEMENT OF HYDATID CYST

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Introduction

For almost a century, the treatment of hepatic hydatid cysts was represented by open surgery, offering various approaches, from simple drainage to partial or complete excision of the cyst.

The recognition of the highly infectious nature of the cystic content necessitated measures to isolate the surgical field and inactivate the parasite using scolicidal substances. This was later complemented by the introduction of antiparasitic and antihelminthic pharmacological therapy, such as benzimidazoles (BMZ).

With the introduction of percutaneous approaches through PAIR (Punction Aspiration Installation Reaspiration) and laparoscopy, this pathology has moved into the realm of minimally invasive techniques, which have become the treatment option of choice.

Previously difficult locations, once exclusively addressed by open surgery, now benefit from minimally invasive techniques thanks to imaging support or the wide visual field and magnification capabilities offered by the working camera and telescope.

Common limitations of percutaneous and laparoscopic techniques are the risk of intra-procedural contamination (spillage) and maintaining a sealed area during procedures.

This situation led to the development of surgical solutions with the design and implementation of adaptable or derived instruments from standard laparoscopic tools, reducing contamination risk, improving intraoperative results, and providing additional comfort to the surgeon.

The aim of this study was to analyze optimal surgical and non-surgical therapeutic solutions for treating hydatid disease in adult patients, but also extended laparoscopically to pediatric patients.

The analysis of demographic data confirms the increased incidence in the rural population, but the gap between rural and urban areas appears to be narrower compared to previous studies, due to migration to urban areas, a phenomenon more pronounced in recent decades.

Additionally, the decline in animal husbandry has resulted in a more balanced distribution of the disease between rural and urban areas compared to the past. The way patients approach

surgical services (emergency/scheduled), symptomatology, biological changes, and imaging are key elements for diagnostic orientation and surgical strategy establishment.

Hepatic hydatid disease is progressive, with cysts increasing in size by up to 1 cm per year, and developing complications in approximately one-third of cases. Preoperative preparation includes acquiring accurate imaging data, preoperative antiparasitic treatment, or stabilization in cases presenting with acute complications.

The percutaneous PAIR approach and its variants represent a valuable therapeutic solution, but the availability of specialized centers and trained personnel is significantly lower compared to surgical services with laparoscopic training and experience.

Moreover, the interventional radiological approach has limitations related to localization, the presence of multiple cysts, and the evolutionary stage, being restricted to hepatic involvement and uncomplicated phases.

It is important that the surgeon handling such a condition has substantial training in laparoscopic surgery and, preferably, the service to which the patient is referred should have experience in hydatid cyst surgery.

This study conducts a multicentric analysis involving four surgical clinics with extensive experience and case studies of hydatid cysts.

The results of surgical treatment using minimally invasive laparoscopic techniques are superior to open surgery, with indisputable advantages regarding patient recovery, the number of intraoperative and immediate postoperative complications, recurrence, hospital stay duration, and even the actual operative time.

In this paper, we analyze the three surgical options: open surgery, standard laparoscopic approach, and laparoscopic approach with dedicated instruments, being the first study to comparatively analyze these techniques.

Hydatid surgery with dedicated instruments successfully addresses complicated cases, recurrences after PAIR and open surgery. It shows a lower conversion rate compared to the usual laparoscopic approach, scoring higher in terms of postoperative complications, hospitalization duration, and surgical intervention duration, allowing for more radical procedures.

Personal Contribution

My doctoral research has resulted in the writing and publication of five ISI-indexed scientific articles and one article indexed in BDI.

The results of the published studies emphasize the importance of utilizing minimally invasive techniques, both in terms of efficiency and postoperative outcomes. The use of dedicated instruments improves the results of minimally invasive surgery and suggests their use or standard laparoscopy as the primary surgical approach. These studies will be summarized below.

Study 1: Analysis of Clinical, Biological, and Imaging Characteristics and Their Influence on Intra- and Postoperative Outcomes

This study observationally and comparatively analyzes demographic, clinical, imaging, operative, and postoperative data, making statistical observations to highlight the influence and interdependence of the analyzed factors.

The results previously reported regarding the higher incidence of this disease in males and its greater prevalence in rural areas are maintained. The number of cases is progressively decreasing, with an increase in emergency cases noted during the COVID-19 pandemic. A statistically significant correlation was found between emergency presentations and rural areas.

Elevated biological marker values correlated with the evolutionary complications of hydatid disease, particularly infectious types and ruptures into the biliary tract. These evolutionary complications significantly influence the surgical option and operative duration. The most common postoperative complication is biliary fistula, with the drainage duration for this type of complication being shorter in minimally invasive approaches and with the use of ERCP.

Presentation mode, biological parameters, type of approach, and intra- and postoperative complications influence the severity degree in the Clavien-Dindo classification.

Hospitalization duration, recurrence rate, and the frequency of long-term postoperative complications are influenced by preoperative, intraoperative, and in-hospital evolution variables.

Summarizing the results of this study, it is noted that a significant proportion of the analyzed categories are in a causal relationship or significantly influence each other. Besides the general observational character, comparative results were obtained that can guide the establishment of a therapy plan, predicting postoperative evolution based on this and the preoperative medical background of each patient.

Study 2: Analysis of Surgical Procedures, Minimally Invasive vs. Open Surgery, Laparoscopy vs. Procedure with Dedicated Instruments

This chapter studies the surgical procedures used in the studied patients, performing a comparative analysis of open surgical technique and minimally invasive approach, subsequently comparing standard laparoscopy with dedicated hydatid surgery instruments.

It was observed that the minimally invasive approach was more frequently used in septic complications and hydatid penetrations into the diaphragm, while classical surgery more often addressed abdominal hydatidosis and biliary tract ruptures.

In the minimally invasive approach, a shorter surgical intervention duration, fewer intraoperative complications, fewer intraoperative procedures, and fewer immediate postoperative complications were noted. Biliary fistula complications had significantly lower productivity compared to open surgery, and the more frequent and severe postoperative complications were associated with an open approach.

Minimally invasive procedures statistically significantly correlate with fewer late postoperative complications, shorter hospital stays, and lower recurrence rates compared to open surgery.

In the comparison of standard laparoscopy with the minimally invasive approach, it is noted that there are variables where the two procedures do not show significant differences. However, the approach with dedicated instruments is superior in terms of operative duration, intraoperative complications, hospital stay duration, and recurrence, where this approach did not identify this complication.

Minimally invasive approaches, encompassing laparoscopy and the dedicated hydatid surgery instruments, are the most efficient procedures regarding operative parameters, postoperative complications, hospitalization, and recurrence. Minimally invasive techniques are

not only addressed for elective cases but also provide a solution for urgent cases or with evolving complications of hydatid disease.

The use of dedicated instruments allows for an isolated, safe working field, translating into fewer complications and intraoperative procedures, shorter operative duration, less frequent postoperative complications, shorter hospitalization, and significantly lower recurrence compared to laparoscopy and open surgery.

Study 3: Comparative Analysis of the Procedure in Surgery Clinic 2 with Similar Procedures in Hydatid Disease Surgical Practice

This study is structured into two parts. The first part analyzes the results obtained from the dedicated instrument procedure in Surgery Clinic 2, and the second part compares this procedure with six similar procedures used in surgical practice.

The procedure designed and implemented by Prof. Dan Sabău, the first to use this type of instrument, has a broader indication, being used in both elective and urgent cases, in adults as well as pediatric patients. It also associates the lowest recurrence rate and is superior to five out of the six procedures concerning the conversion rate.

Study 4: Management of Hydatid Cyst in Particular Situations: Complicated Hydatid Cyst, Pediatric Patients with Hydatid Cyst, Particular Situations in Hydatid Cyst Surgery

This study is structured into three sections. The first section analyzes cases with evolutionary complications of hydatid disease and the indications and results of surgical procedures in these particular situations.

Minimally invasive techniques find their role even in the surgery of hydatid disease complications, even in cases where the open approach was typically the primary indication. When utilized, the minimally invasive approach, particularly with specialized instruments, yields superior results compared to the open technique.

The second part of the study analyzes pediatric cases resolved exclusively through a minimally invasive approach, comparing the results obtained with the same approach in adults.

Although in a small number, the minimally invasive approach addressed to pediatric patients brings benefits, which, even if only at an observational level, are superior to results from adult surgery.

The particular situations described in the third part of the study emphasize the importance of utilizing minimally invasive techniques even in cases traditionally approached surgically.

Originality and Innovative Contributions of the Thesis

This thesis addresses the issue of surgical treatment for hepatic hydatid disease and other abdominal localizations, considering the unique complexities associated with its complications, therapeutic modalities, and their outcomes.

The present study makes a significant contribution to the medical community, particularly to surgical specialties, by highlighting the results of minimally invasive surgical techniques as an alternative to open surgery and percutaneous procedures.

The originality of the thesis lies in the analysis of minimally invasive procedures in comparison to open surgery, not only from the perspective of laparoscopy versus open approach but also by studying the Surgery Clinic 2 procedure as a component of minimally invasive techniques. This procedure uses instruments adapted to intraoperative needs in hydatid surgery.

Furthermore, the work compares the efficiency of the laparoscopic procedure using standardized instruments with the one utilizing dedicated instruments. Similar procedures used in surgical practice are also analyzed and compared in terms of results with each other and with the procedure used in our service.

The procedure employed is original, patented, with long-term applicability in the clinic's case studies, and has shown superior results compared to open surgery and standard laparoscopy. Its quality has been recognized with numerous awards at innovation fairs.

Additionally, this thesis analyzes particular situations of hydatid disease, such as its evolutionary complications, less common localizations, or pediatric patients, by relating them to the surgical procedures used.

This study reinforces and encourages the implementation of minimally invasive techniques as the first-line surgical solution for hydatid cysts, as an alternative or associated therapeutic

solution in the complex, multimodal, and multidisciplinary management that this type of condition requires.