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Biliary Lithiasis: An Epidemiological, Clinical and Therapeutic Retrospective Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author OEY designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DE and BY managed the analyses of the study. Author DE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Biliary lithiasis can be defined as the presence of concrements in the gallbladder, the biliary ducts, or both. Patients are mostly asymptomatic in over 80% of cases and are discovered by chance during a rouine ultrasound scan. When symptomatic, it can manifest as hepatic colicky pain or as serious life-threatening complications requiring surgery as the only method of treatment.
Methods: In this work we report a study of a series of 316 biliary lithiasis cases reported in the Department of Surgery for a period of one year i.e. from 2018 to 2019.
Results: Female predominance was 78% while males represented only 22% of the total cases; with 24.68% in patients over 40 years of age. It can manifest itself as simple vesicular lithiasis (93.35%) or complications (6.64%) including cholecystitis (23.8%; n=21), lithiasis of the main biliary tract or angiocholitis (76.19%; n=21). The treatment is mainly surgical, either by laparoscopy (93%) or by laparotomy (7%). Post-operative complications were noted in 12 patients (3.8%).

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Conclusion: As it is common in clinical practice, biliary lithiasis should be approached in a multidisciplinary fashion, employing the most convenient diagnostic procedure relevant to the clinical condition of the patient.

Keywords: Biliary lithiasis; cholecystectomy; gall bladder; main bile duct; complications; epidemiology.

ABBREVIATIONS

ALAT : Alanine-aminotransférase
ASAT : Aspartate amino transférase
ERCP : Endoscopic Retrograde Cholangiopancreatography
GGT : Gamma glutamyl transpeptidase
MRI : Magnetic resonance imaging
PAL : Phosphatases alcalines
MBD : Main bile duct

1. INTRODUCTION

Biliary lithiasis (BL) is a frequent pathology that every surgeon is regularly confronted with.

It is defined by the presence of one or more stones in the bile ducts (gallbladder, main bile duct or intrahepatic bile ducts [1].

Biliary lithiasis is cholesterolic in 80% of cases. The other types of stones are pigmentary in nature, either black or brown, consisting of calcium bilirubinate [1].

The diagnosis is clinically suspected but is confirmed by hepatobiliary imaging via ultrasonography as the first line of diagnostic investigation.

Laparoscopic cholecystectomy is the reference procedure for the treatment of symptomatic biliary lithiasis.

The objective of this study, that was conducted in the Department of General Surgery of the CHU IBN ROCHD is to study the epidemiological and clinical aspects, to evaluate the management of biliary lithiasis and to compare them with data from literature in order to assess the quality of management given in our Institute.

2. METHODS

This is a retrospective study running from the 1st of February 2018 to 31st January 2019 involving 316 patients who were treated in the Department of General Surgery of the CHU IBN ROCHD CASABLANCA hospital. The data for the study were provided by the registers of the inpatient department.

The inclusion criteria are: Any patient with biliary lithiasis, availability of a complete medical observation including the patient's detailed history, demography, clinical signs, the various complementary examinations carried out, the therapy instituted, and progress. However, incomplete or non-recovered records have been excluded.

2.1 Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences, version 11.0 (SPSS). Categorical variables are expressed as frequencies (and percentage), and continuous variables are expressed as the mean ± standard deviation.

3. RESULTS

In our study, biliary lithiasis was manifested as simple vesicular lithiasis (93.35%) or in the form of following complications (6.64%) such as cholecystitis (23.8%; n=5), lithiasis of the main biliary tract (76.19%; n=16) and pancreatitis (0.32%; n=1). No cases of angiocholitis, intrahepatic lithiasis or neo-calculus were reported among the patients involved in this study.

The mean age was 50.07 years with extremes of 16 and 86 years, with an overall peak frequency between 41 and 50 years (Fig. 1).

The gender distribution was marked by a predominance of females at 78% while males accounted for only 22%; with a percentage of 24.68% in patients over 40 years of age and a gender ratio of 3.6 (Fig. 2).

Of the 316 patients, 112 had co-morbidities (Table 1) and 204 had no medical history.

At the time of the clinical examination, 314 patients had a good state of health (99.36%) only 2 of them (0.6%) were in poor general condition.

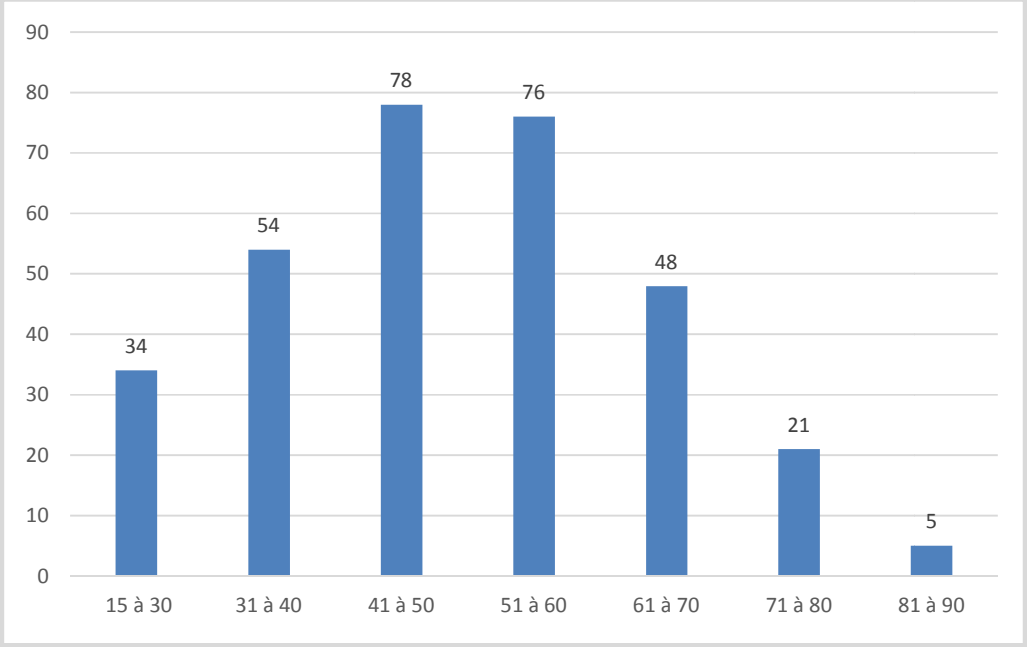

Fig. 1. Distribution of patients by age group

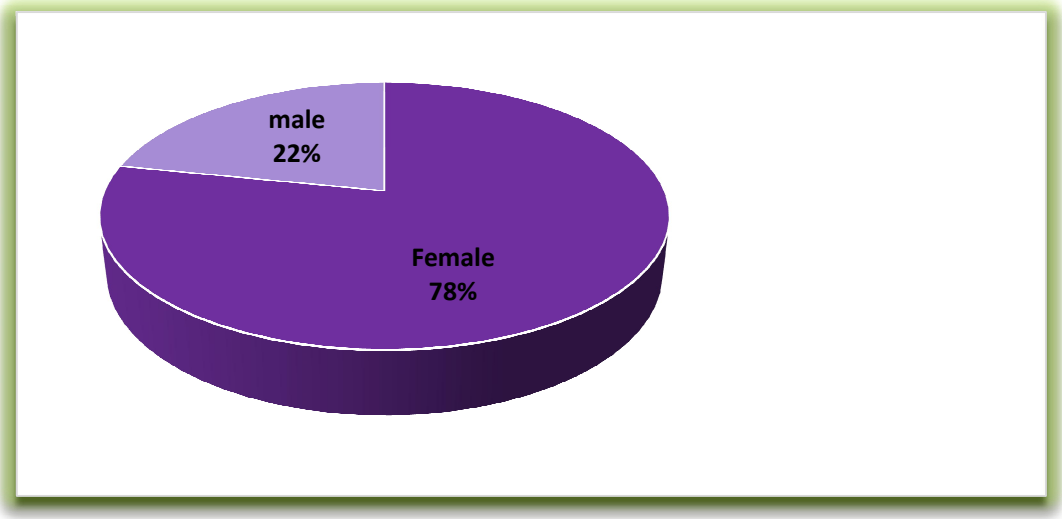

Fig. 2. Distribution of biliary lithiasis by sex

Table 1. Frequency and percentage of co-morbidities found in patients

Comorbidities	Frequency	Percentage
Diabetes	30	3%
HTA	48	4.8%
Tuberculosis	6	0.6%
Gastric pathology	2	0.2%
Smoking	9	0.9%
Alcohol	3	0.3%
others	62	6.2%

The average duration of symptomatology onset was 392.4 days or 13 months; with a minimum of 15 days and a maximum of 1825 days or 5 years. The standard deviation is 15.03 months (450.9 days).

Most of the patients (308 cases) felt pain during the consultation, i.e. 97.4% of the cases, the remaining 2.5% (8 cases) discovered biliary lithiasis by chance: Either in the context of another pathology (2 cases) or during a general check-up (6 cases).

Among the 308 patients we noted a predominance in the right hypochondrium in 97.72%, i.e. 301 patients; and in the epigastrium in 8.44%, i.e. 26 patients. As for the other seats, they were less frequent.

For the characteristics of the pain; it was paroxysmal in 228 patients, i.e. 74.02% of cases. And it was continuous in 80 patients, i.e. 25.97% of cases; 286 patients stated that the pain radiated to the right hypochondrium.

The physical examination data were dominated by abdominal tenderness in the right hypochondrium in 199 patients, i.e. 62.97%; Murphy's sign was positive in 217 patients and negative in the other 99 patients; jaundice was also observed in 5 patients.

For the biological assessment 71 patients (22.46% of cases) had presented a biological cholestasis, with lipasemia increased to 3 times normal in one patient. Abdominal ultrasound was performed in all our patients. Abdominal CT scan was performed in only 6.4% (n=14). Magnetic resonance imaging was performed in 49 patients (Table 2).

The treatment is mainly surgical, either by laparoscopy (93%) or by laparotomy (7%).

Table 2. Breakdown of MRI abnormalities by patients

	Number of cases	Percentage	Valid percentage (N=49)
Simple vesicular lithiasis	32	10.38%	65.3%
Lithiasis of the main biliary tract	16	5%	32.65%
Acute cholecystitis	2	0.64%	14.2%
Hepatic angioma	6	1.94%	12.24%
Hydatid cyst	3	0.97%	6.12%
Acute pancreatitis	1	0.32%	2%
Cancer of the gallbladder	0	0%	0%

Fig. 3. Multi-lithiasis gallbladder with bile duct and lower bile duct lithiasis

308 patients were treated surgically, while the remaining 8 cases were treated medically without surgery; given the inoperability of patients with associated comorbidities.

For patients with main bile duct lithiasis Several therapeutic strategies have been proposed, an "all-surgical" treatment which was carried out in 5 patients and for the rest of the patients surgery associated with endoscopic treatment (ET), an endoscopic sphincterotomy which was carried out first and then the patient was referred for a cholecystecomy in the second time.

Conversion to open cholecystectomy was needed in 8 patients (2.5%) of which 3 (0.9%) had previous upper abdominal surgery and 5 (1.6%) had acute severity of inflammation of the gallbladder. Also, the conversion from laparoscopic to open cholecystectomy in acute cholecystitis patients was associated with greater white blood cell count, fever, elevated total bilirubin, aspartate transaminase and alanine transaminase levels, and the various types of inflammation.

This conversion rate of 2.5% is lower than the rates of the major series of AFC and the North American surgical association in which it is 6.3% and 5% respectively.

The average length of hospitalisation for patients in our series is 6.6 days. 2 days is the shortest duration and 39 days is the longest. With a standard deviation of 4.6, post-operative complications were noted in 12 patients (3.8%).

Histo-pathological biopsy of the tissue specimens was done in 308 operated cases. However, none of the patients histo-pathology biopsy results suggested biliary cancer.

4. DISCUSSION

The importance of biliary lithiasis is given by its high prevalence and considerable potential for complications. Cholecystectomy is known to be the third most common abdominal procedure after appendicectomy and hysterectomy [2].

Biliary lithiasis is a very common condition because in developed countries it is one of the most common surgical problems. In our series, we collected 316 cases over a period of 1 year; but this underestimates the true prevalence of biliary lithiasis in our region for several reasons: The very high latency of the condition, our exclusion bias, and consultations and surgeries performed in other health facilities, especially private practices and clinics, which are not part of our study.

In European populations, the average prevalence figure varies from 10 to 12%, 13 to 28% in the American population [3] and 3 to 4% in the Asian population [4].

In Africa, the ultrasound prevalence of TB is poorly known. In the city of Soweto in South Africa, the prevalence among women aged 50-85 years was 10% [5]. In Sudan, it was 5.2% in a group of citizens of the city of Khartoum whose ages ranged from 22 to 70 years [6]. The prevalences were overestimated in both studies; in the first study, due to a selection of an older female population; in the second, due to insufficient rural participation and sampling error. In addition, these studies have focused on black populations in which LB is classically rare regardless of nationality.

At all ages, prevalence is about twice as high in women as in men. This difference, however, diminishes after the age of 70. Between the ages of 50 and 60, prevalence is about 10% in men and 20% in women [1]. The study by Carmen et al. [3] found that prevalence was higher in women (11.5%, 95% CI 8.2 to 14.7) than in men (7.8%, 95% CI 4.06 to 11.01).

In a recent study, published in 2011, established in Turkey, among the 1500 patients who participated in the study, 69.9% were women while men accounted for only 30.1% [7].

The classical female predominance in biliary lithiasis is evident in our series, which is in line with the results of other autopsy, surgical or epidemiological studies where women were found to have two to three times more stones than men [8].

In our series of studies 78% were women while men represented only 22%. Men are little affected by lithiasis, which leads us to believe that environmental factors such as lifestyle and diet have little influence on biliary lithogenesis in our region and this was the case for the Tunisian study as well, where the prevalence was 5.4% in women (41 patients out of 746 women explored), and was less than 1% in men (4 out of 377 men explored); the gender ratio was 5.4 with a significant difference (P = 0.00045) [5].

Lithiasis are the result of a complex pathophysiological cascade, not elucidated in all its details, and vary according to their composition [9,10].

Three factors are involved in cholesterol stones. An excess of cholesterol compared to phospholipids and bile acids in the bile causes saturation which leads to the formation of cholesterol crystals. Persistence in the gallbladder then promotes the formation of crystals, which aggregate to form microliths and finally gallstones. The recent discovery of bacterial DNA, and in particular Helicobacter spp. in 90% of cholesterol lithiases [11,12] raises the question of whether bacterial contamination of the gallbladder is of etiopathogenic importance in lithogenesis. Black pigmentary lithiases originate mainly from bilirubin saturation of the bile, with precipitation of calcium bilirubinate, with other calcium salts and matrix proteins. Brown pigmentary lithiases are formed as a result of bacterial infections, mostly in connection with obstruction of the bile ducts. Bacterial enzymes precipitate bile salts, conjugated bilirubin and lipids (Fig. 4) [2]. A particular manifestation is "sludge" (sand or microlithiasis), which was first described as an ultrasonographic phenomenon [13]. It may be spontaneously reversible, but may recur or give lithiasis. During a 3-year follow-up, 5-15% progression to lithiasis was observed. The sludge should therefore be considered as a preliminary stage of biliary lithiasis.

The vast majority of biliary lithiasis carriers are asymptomatic. But quite frequently, concomitantly, they present an association of symptoms designated by the term biliary dyspepsia. This is a functional clinical picture, the etiology of which is unknown and whose causal relationship with biliary lithiasis has never been demonstrated [15]. Biliary lithiasis carriers suffering from biliary dyspepsia should therefore be put on the same footing as asymptomatic carriers with regard to the therapeutic indication.

In our series, 2.5% of the cases had asymptomatic biliary lithiasis but this is not a criterion to infer that asymptomatic BL is rare in our region, since our study was carried out in a university hospital centre which mainly receives symptomatic forms for surgery.

For Symptomatic cholelithiasis; Stones that obstruct the vesicular infundibulum or cystic, this gives typical biliary symptoms. This pain of stable, dull and oppressive intensity is usually called "hepatic colic", which strictly speaking is false. It occurs episodically, in the middle of blue skies, often at night, and is not necessarily

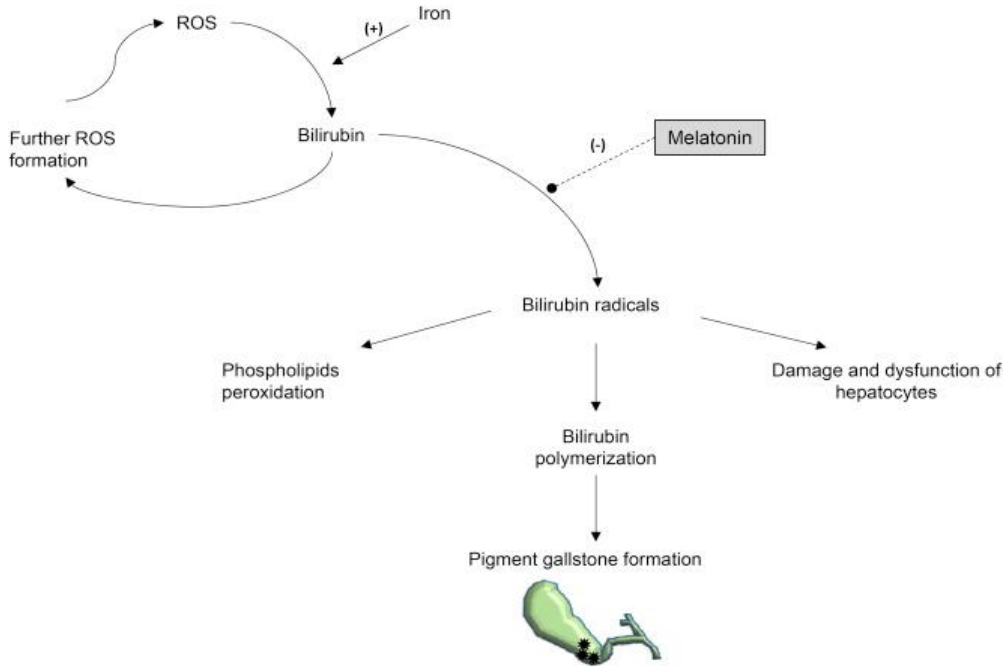

Fig. 4. The stages of pigmentary calculus formation [14]

dependent on food intake. It reaches its peak between 15 minutes and 1 hour, and lasts from 30 minutes to a few hours. Most patients can perfectly date them retrospectively. Pain of longer duration should be reminiscent of cholecystitis or pancreatitis. Biliary pain is localized in the epigastric region or the right hypochondrium and may radiate into the right shoulder. Accompanying vegetative symptoms such as nausea, vomiting and sweating are common. Physically, the patient is agitated [15].

Data from the Project for the Medicalization of Information Systems (PMSI) 1998 show about 70,000 complicated biliary lithiasis (BL) and 60-80,000 cholecystectomies performed [16], whereas in our series we found 21 complicated BL among 316 cases.

Ultrasonography remains the examination of choice for detecting biliary lithiasis.

Abdominal ultrasound is currently the first-line examination in the diagnosis of biliary lithiasis. Although it depends on the examiner, its sensitivity and specificity is very high in practice, 95% in the diagnosis of cholelithiasis. Oral cholecystography, commonly practised in the past, has been completely replaced by ultrasound [17].

Abdominal ultrasonography also remains the first morphological examination to be carried out in case of suspicion of Main Biliary duct Lithiasis. The specificity of ultrasonography for VBP is relatively high: From 80% to 90% depending on the series [18].

Its sensitivity in this indication ranges from 13% to 75%. Several factors explain this difference in range: the experience of the operator as well as the subjects examined, bearing in mind that sensitivity decreases significantly in a patient with low echogenicity (obesity); and among these factors also the size and topography of the stone.

The scanner has a relatively low sensitivity in the diagnosis of main bile duct (MBD) stones and it is even lower the more the stones are rich in cholesterol due to their low density and the contrast with the surrounding structures decreases considerably.

In order to improve their detection, the scan is first performed without injection. After injection, it reveals indirect signs of angiocholitis, such as an inflammatory thickening of the bile walls and contrasting bile ducts.

Peripheral or peribiliary hypervascular areas may also be present, followed by peribiliary abscesses in the final stage [19]. In our series, the CT scan was performed on only 14 patients (6.4%).

The Bili-MRI has become the best examination for exploration of the bile ducts (BD), apart from ultrasound, for the study of the gallbladder.

It has the same value as trans hepatic cholangiography (THC) or retrograde bile duct catheterization by duodenoscopy (ERCP) without the disadvantages of these invasive techniques. In addition, it is rapid, can be performed urgently and does not give rise to complications [20].

In the event of an obstruction, it shows the bile ducts above and below the obstruction, which neither ERCP nor THC does. In our series, it was carried out in 49 cases. It allowed us to confirm the lithiasis of the main bile duct (MBD) in 16 patients, i.e. 32.65%.

Magnetic resonance cholangiography (cholangio-MRI) and echo-endoscopy, using an ultrasound probe carried by an endoscope, are even more sensitive tests for detecting a main bile duct calculus [21].

In asymptomatic cholelithiasis, the theoretical question of prophylactic treatment arises, with the intention of preventing future colic, complications or vesicular carcinomas. However, the value of prophylactic cholecystectomy has not been proven [22]. With the exception of biliary lithiasis in children, chronic haemolytic anaemia, stones >3 cm and porcelain vesicle. The "cholecystectomy in passing" as part of an abdominal operation for non-biliary indications is discussed [23]. Data exist for renal transplantation, which justify abstention [24].

In symptomatic cholelithiasis, after a first colic, the field of decision is wide open, since a good part of the patients will not present any recurrence, even without any treatment. If, on the other hand, biliary colic recurs, the indication for treatment is usually given to prevent new colic on the one hand, and serious complications on the other [17].

Laparoscopic cholecystectomy has emerged in recent years as the treatment of choice for cholelithiasis [25]. It now accounts for 75-80% of all cholecystectomies. Its advantages are less scarring pain, shorter hospitalisation and work

incapacity, and in our series we found an average post-operative hospitalisation period of 1.88 days. Despite the fact that laparoscopically operated patients are selected, a Scottish study did not show any reduction in mortality or costs in the setting of central data processing [26]. In a large Swiss study (without casuistic gaps) on laparoscopic cholecystectomy, mortality was 0.2% and morbidity 10% [26] in our series the mortality rate is nil and this is the case in several studies found in the literature. This rate varies between 0.1 and 0.4% for other authors. Laparoscopic cholecystectomy is therefore currently a mature technique, practically risk-free, for the treatment of symptomatic vesicular lithiasis. Its contraindications are vesicular carcinoma, severe coagulation disorders and cirrhosis with metabolic and vascular decompensation; its relative contraindications are pregnancy, adhesions, status after total or partial gastric resection of type B-I or B-II, and large abdominal hernias. Some 40% of cholecystectomized patients will not be free of their problems after the operation (post-cholecystectomy syndrome) [27].

After laparoscopic cholecystectomy, 5% have Visick grade III problems (i.e. significantly reduced performance and/or quality of life episodically or permanently), 2% can no longer perform their social tasks or require reoperation (Visick IV) [28]. Diarrhea (5%) and duodenogastric bile reflux are genuine post-cholecystectomy symptoms occasionally observed. If typical biliary pain recurs, non-extracted choledochlear lithiasis should be investigated. Symptoms of cholestasis or cholangitis occurring soon after surgery should suggest the possibility of iatrogenic bile damage. Lithiasis "lost" in the peritoneal cavity rarely causes symptoms, and often only after several years. The persistence of postoperative symptoms has just as often something to do with the "generous" indication and the selection of patients without critical consideration. Functional symptoms such as biliary dyspepsia do not disappear after cholecystectomy. Irritable bowel symptoms may even be accentuated after cholecystectomy. Predictors of an unsatisfactory outcome are the absence of typical biliary pain, and symptoms of depression and anxiety [29].

5. CONCLUSION

Biliary lithiasis is a frequent pathology that every general surgeon is regularly confronted with; its treatment is based on surgery which is becoming more and more efficient and modified; this is thanks to the technical progress made in preoperative, radiological and endoscopic explorations. New surgical therapeutics such as video-assisted cholecystectomy has led to a more precise analysis of the indications in order to make an adequate therapeutic choice.

CONSENT

Written and informed participant consent was preserved by the authors.

ETHICAL APPROVAL

As per international standard guideline, written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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