



Gallbladder polypoid lesions are inaccurately reported and undermanaged: a retrospective study of the management of gallbladder polypoid lesions detected at ultrasound in symptomatic patients during a 36-month period



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AIM: To investigate whether gallbladder polypoid lesions (GPL) are accurately reported and managed by radiologists, sonographers, general practitioners (GPs) and surgeons.

MATERIALS AND METHODS: Consecutive abdominal ultrasound examinations indicating GPL in symptomatic patients performed during 2011–2013 were captured and analysed. The study comprised 244 patients who satisfied the inclusion criteria.

RESULTS: Of the ultrasound reports retrieved, 238/244 reports (98%) erroneously described the polypoid lesions as polyps. One hundred and thirty-two of the 244 (54%) reports recommended follow-up, 5/244 (2%) recommended no follow-up, 35/244 (14%) deemed the findings insignificant, and 72/244 (30%) did not comment. Regarding GP referral, 57/184 (31%) patients were correctly referred to general surgeons, 20/184 (11%) to gastroenterologists, and 107/184 (58%) were not referred to secondary care. Forty-three of the 244 patients (18%) underwent cholecystectomy. Regarding subsequent biliary presentations, 63/244 patients (26%) presented at a later date with biliary symptoms; 13/63 (21%) of these eventually had cholecystectomies with 2/13 (15%) experiencing potentially life-threatening pancreatitis episodes. Regarding the surgical approach, differences were observed in the way individual surgeons managed polypoid lesions, with some veering towards cholecystectomy, others towards follow-up ultrasound, and some towards discharge.

CONCLUSION: GPL tend to be misreported by radiologists and sonographers, unappreciated by GPs, and variably managed by surgeons. These factors delay definitive therapy and seem to contribute to future biliary presentations. A fresh educational approach is required to raise awareness among radiologists, sonographers, and GPs regarding the clinical relevance and possible representations of GPL, and a uniform strategy is needed for managing GPL.

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Introduction

Gallbladder polypoid lesions (GPL) are defined as projections of the gallbladder wall into the lumen and are often found incidentally.¹ They are discovered in approximately 3–7% of abdominal ultrasound examinations and 2–12% of cholecystectomy specimens, making them relatively common.^{2–6} GPL can represent true gallbladder polyps, adherent gallstones, biliary sludge, cholesterol polyps, adenomyomatosis, or inflammatory polyps.¹ True gallbladder polyps are mostly benign but can rarely be malignant in approximately 2% of cases,⁷ in which case the 5-year survival rate is 5–12% when discovered at a late stage.⁸ Their incidence when discovered at ultrasound is approximately 0.6%.⁹ Soft, adherent gallstones can lead to biliary colic, cholecystitis, cholangitis, or pancreatitis, although most patients are asymptomatic.¹⁰ Biliary sludge can develop into gallstones, although mostly disappears over time.¹¹ Cholesterol polyps, adenomyomatosis, and inflammatory polyps have the potential to become troublesome.¹ All of these possibilities must be considered in patients with biliary symptoms: the trouble lies in how to reach the correct diagnosis given that abdominal ultrasound is limited in its utility to characterise GPL.

There is a lack of consensus regarding the management of GPL. Recently published joint guidance (Fig 1) by various bodies (European Society of Gastrointestinal and Abdominal Radiology [ESGAR], European Association for Endoscopic Surgery and other Interventional Techniques [EAES], International Society of Digestive Surgery-European Federation [EFISDS], and European Society of Gastrointestinal Endoscopy [ESGE]) states that GPL ≥ 10 mm should be treated with laparoscopic cholecystectomy^{12,13} as such lesions are 24 times more likely to be cancerous.⁸ Management of lesions <10 mm depends on patient and polypoid characteristics. If the patient exhibits biliary dyspepsia, cholecystectomy is advised.¹³ If the patient has risk factors for gallbladder malignancy and the polypoid lesion is <6 mm, follow-up ultrasound is advised, whereas if the size is 6–9 mm, cholecystectomy is advised.¹³ If the patient is asymptomatic with no risk factors, follow-up ultrasound is advised.¹³

Materials and methods

A database was created to capture all consecutive abdominal ultrasound reports during 2011–2013 that included the following key words: “gallbladder polyp”, “gall

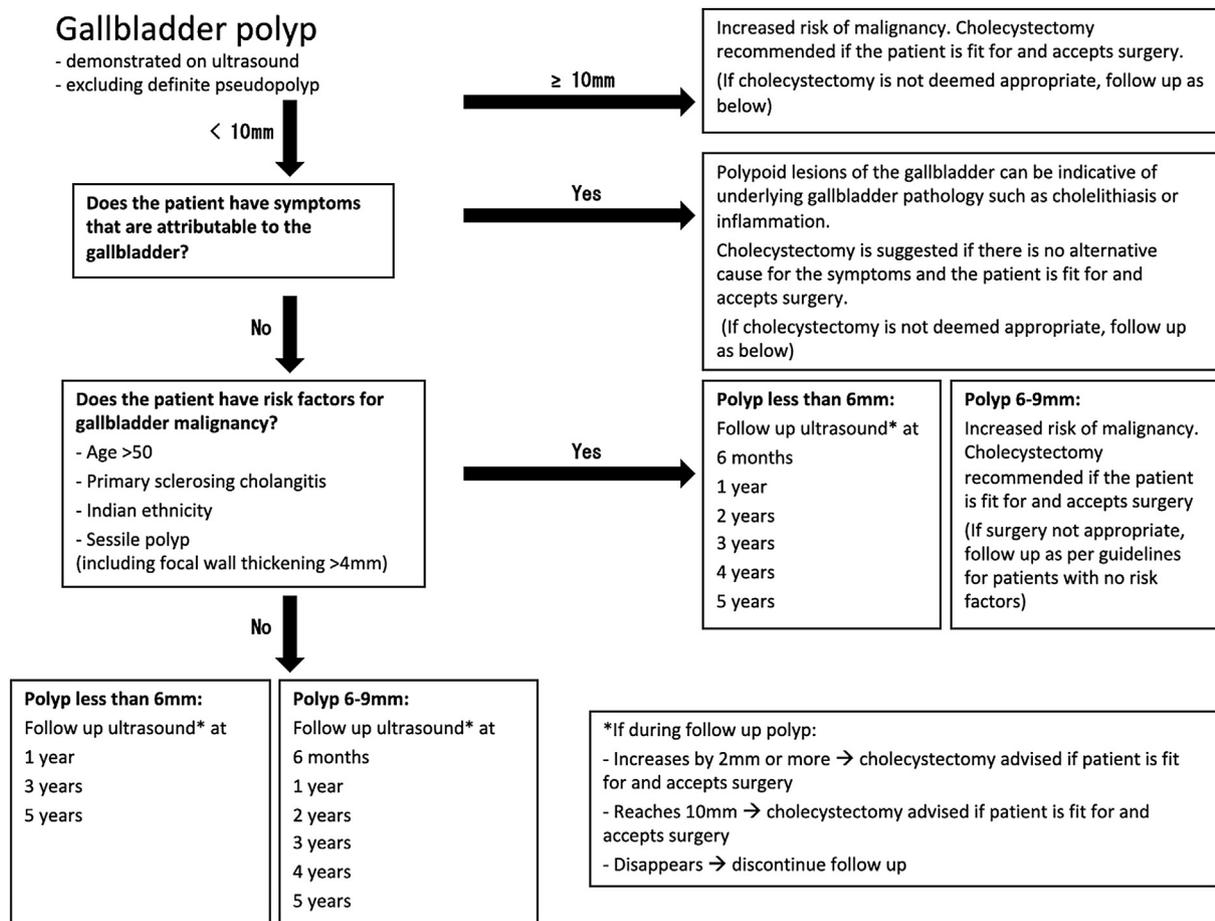


Figure 1 Management algorithm for GPL. (Reproduced under the Creative Commons Attribution 4.0 International License from Wiles et al., 2017).

bladder polyp”, “gallbladder polypoid”, or “gall bladder polypoid”. This permitted a follow-up period of at least 4 years. The database was populated with the following: source and reason for referral, number and sizes of the polyps, other gallbladder pathology, the recommendation (if any), whether they had cholecystectomies, postoperative histology, any follow-up examinations and if they had any further biliary presentations following the initial ultrasound report that deemed the findings to be insignificant. Information relating to previous ultrasound examinations and other relevant investigations (e.g., computed tomography [CT], magnetic resonance cholangiopancreatography [MRCP]) and future examinations were also noted. The examinations were performed by either sonographers (89%) or radiologists (11%).

Of the patients who had cholecystectomies, histological examination was carried out by fully qualified consultant histopathologists in fully accredited laboratories. For the purposes of this study, all histological sections of the gallbladders (except one performed at a different centre) were reviewed by a single consultant histopathologist, who participates in national quality-assurance schemes, and assisted by a trainee in histopathology. Ultrasound images were also reviewed by a consultant radiologist to identify any relevant correlations between histopathology and image findings.

The inclusion criteria for the study were patients that had symptoms suggestive of a biliary source. These include upper abdominal pain, right upper quadrant pain +/- radiation to right shoulder tip, epigastric pain, postprandial back pain, nausea, vomiting, bloating, and fatty food intolerance.¹² Symptoms were assessed by reviewing the ultrasound referral reports and patient notes. A total of 244 patients (84 male, 160 female) satisfied the inclusion criteria. They had a mean age of 50.6 years at the time of the scan and were all from the South Wales area and were predominately Caucasian. A total of 296 patients who were referred for abdominal ultrasound had symptoms suggestive of other aetiologies and hence were excluded from the study. Given that the inclusion group all had symptoms suggestive of a biliary source in addition to ultrasound-detected gallbladder polypoid lesions, they should all have had some form of active management as per the aforementioned 2017 guidelines. The focus was on symptomatic patients because of the observation by the present authors that a large subset of these patients continually re-present with no apparent resolution of their symptoms. Local committee ethical approval was obtained for this retrospective study.

Results

A total of 238/244 reports (98%) described the polypoid lesions as polyps. A total of 191/244 (78%) reports stated that the lesions measured <10 mm, 10/244 (4%) were >10 mm, and 43/244 (18%) were not measured. A total of 144/244 (59%) were single polypoid lesions, whereas 100/244 (41%) patients had multiple polypoid lesions.

A total of 12/244 (5%) reports recommended follow-up, 120/244 (49%) recommended follow-up if symptoms persisted or worsened, 5/244 (2%) recommended no follow-up, 35/244 (14%) deemed the findings as insignificant, and 72/244 (30%) did not comment on significance or follow-up.

Radiologist reports

A total of 25/27 reports (93%) described the polypoid lesions as polyps. A total of 14/27 (52%) reports stated that the polypoid lesions measured <10 mm, 6/27 (22%) were >10 mm, and 7/27 (26%) were not measured. A total of 18/27 (67%) were single polypoid lesions, whereas 9/27 (33%) patients had multiple polypoid lesions.

A total of 8/27 (30%) reports recommended follow-up, 0/27 (0%) recommended follow-up if symptoms persisted or worsened, 1/27 (4%) recommended no follow-up, 2/27 (7%) deemed the findings as insignificant, and 16/27 (59%) did not comment on significance or follow-up.

Sonographer reports

A total of 213/217 reports (98%) described the polypoid lesions as polyps. A total of 177/217 reports stated that the polypoid lesions measured <10 mm, 4/217 (2%) at >10mm and 36/217 (17%) did not measure them. A total of 126/217 (58%) were single polypoid lesions whilst 91/217 (42%) were multiple polypoid lesions.

A total of 4/217 (2%) reports recommended follow-up, 119/217 (55%) recommended follow-up if symptoms persisted or worsened, 33/217 (15%) recommended no follow-up, 35/217 (16%) deemed the findings as insignificant, and 56/217 (26%) did not comment on significance or follow-up.

Actions of general practitioners after receiving ultrasound reports

The vast majority of the patients (184/244; 75%) were originally referred for ultrasound via their general practitioner (GP), 46/244 (19%) were referred via a surgeon, whereas the remaining 14 (6%) were referred from other specialties. Of those referred via their GP, 57/184 (31%) were referred to general surgeons, 20/184 (11%) were referred to gastroenterologists, and 107/184 (58%) were not referred to secondary care.

Patients who had cholecystectomies

A total of 43/244 patients (18%) eventually had cholecystectomies (30/244, 12%, after the initial presentation). Of these, 34/43 (79%) had a clinical diagnosis of cholecystitis, 6/43 (14%) of pancreatitis, and 3/43 (7%) were suspected to have malignancy.

Review of the histology revealed 27/43 (63%) xanthogranulomatous chronic cholecystitis (XCC), 13/43 (30%) chronic cholecystitis, 5/43 (12%) adenomyomatosis in addition to chronic cholecystitis (four cases) or xanthogranulomatous cholecystitis (one case), 1/43 true polyp (dysplastic adenoma) in addition to XCC, 1/43 acute gangrenous cholecystitis, and 1/43 malignant (the histology

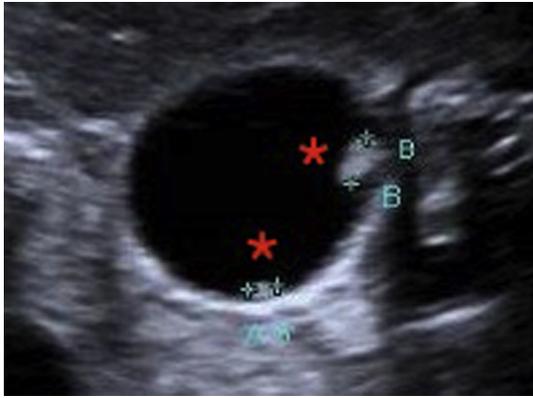


Figure 2 Example of gallbladder polypoid lesions (asterisks) discovered at abdominal ultrasound. As aforementioned, these can represent far more than true polyps.

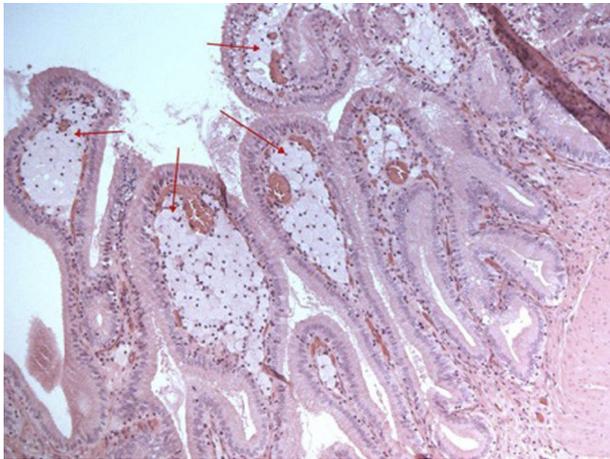


Figure 3 Haematoxylin and eosin stain demonstrating XCC with foamy histiocytes (arrows) in the lamina propria. Magnified at $\times 1.25$.

of this particular case was not re-reviewed because it was performed at a different hospital); [Figs 2–4](#).

On further evaluation of the ultrasound findings, only 42 reports were available as one patient's examination was performed elsewhere. Regarding size, 7/42 (16.5%) polypoid lesions were >10 mm (mean 6.57 mm, median 5.05 mm, range 2–30 mm). The largest polypoid lesion, measuring 30 mm, was a dysplastic adenomatous polyp with XCC. A 17 mm lesion was malignant and treated with cholecystectomy in the regional centre and was clear at most recent follow-up CT in 2018. Among the remaining five polypoid lesions measuring >10 mm, gallbladder pathology ranged from XCC ($n=2$), chronic cholecystitis ($n=4$), and adenomyomatosis ($n=2$; [Tables 1 and 2](#)).

The majority of the 42 polypoid lesions were single (27/42, 64%), with 15/42 (36%) being multiple. When there were multiple polypoid lesions, only the largest measurement was considered. Pathological correlation of single versus multiple among this small cohort demonstrated that the adenomatous polyp ($n=1$) and malignant polyp ($n=1$; [Fig 5](#))

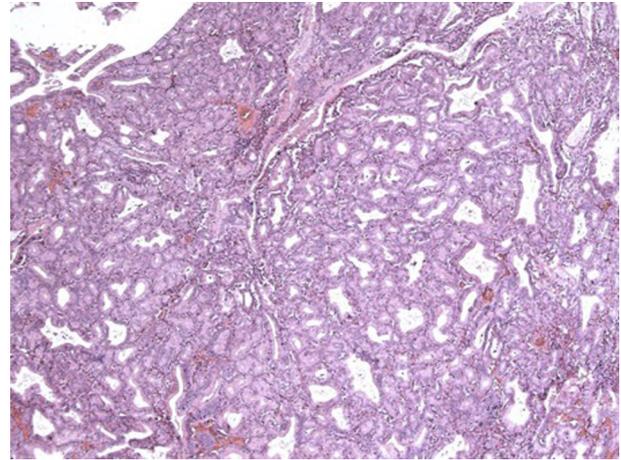


Figure 4 Haematoxylin and eosin stain demonstrating the one case of dysplastic adenoma, which radiologists are keen to exclude (see Discussion). [Figs. 3 and 4](#) will have the same appearance on ultrasound. Magnified at $\times 1.25$.

were both single. Multiple polypoid lesions were either XCC (7/15, 47%), XCC and adenomyomatosis (1/15, 7%), chronic cholecystitis (5/15, 33%), chronic cholecystitis and adenomyomatosis (1/15, 7%) or acute gangrenous cholecystitis (1/15, 7%). Among the examinations that demonstrated single polyps, pathology ranged from XCC (18/27, 67%), XCC and an adenomatous polyp (1/27, 4%), chronic cholecystitis (4/27, 15%), chronic cholecystitis and adenomyomatosis (3/27, 11%) and one malignant polyp (1/27, 4%). It is observed that a true polyp is more likely to be a single abnormality ([Tables 1 and 2](#)). Only a small number of the examinations identified the presence of gallstones (11/42, 26%), whereas the remainder had no gallstones (31/42, 74%).

Operators among the 42 patients were mostly sonographers (32/42, 76%), with a small proportion of consultants (10/42, 24%). 31 of these reports identified the polypoid lesions, and provided a statement or a comment within the report to specifically guide further clinical management of the polypoid lesion. These statements/comments included “polyp less than 1 cm”, “needs surgical referral”, and “MRI advised”. Although the remaining 11 patients appeared to have no specific comments regarding the polyp, there was additional information in the report such as “on follow-up and unchanged”, “polyp measured and small”, “?polyp/calculi”, or had other more significant findings. Overall no significant discrepancies or misses were identified within these 42 reports.

Subsequent presentations of patients

A total of 63/244 patients (26%) presented subsequently with biliary symptoms; 13/63 (21%) of these went on to have cholecystectomies. Regarding histology, 7/13 (54%) demonstrated XCC, 6/13 (46%) chronic cholecystitis, 3/13 (23%) adenomyomatosis in addition to chronic cholecystitis, and 1/13 (8%) adenomatous polyp. A total of 2/13 patients (15%) experienced pancreatitis episodes. Forty-three of the

Table 1
Comparing histopathology with ultrasound-detected sizes of single polypoid lesions.

Histopathology	Frequency	Size range (mean, median)
Xanthogranulomatous chronic cholecystitis (XCC)	18	2–8 mm (4.8 mm, 4.7 mm)
XCC and adenomyomatosis	0	N/A
XCC and adenomatous polyp	1	30 mm (30 mm, 30 mm)
Chronic cholecystitis	4	5.8–12 mm (8.4 mm, 6.3 mm)
Chronic cholecystitis and adenomyomatosis	3	2–11.4 mm (6.3 mm, 5.6 mm)
Acute gangrenous cholecystitis	0	N/A
Malignant	1	17 mm (17 mm, 17 mm)
Total	27	

Table 2
Comparing histopathology with ultrasound-detected sizes of multiple polypoid lesions. Multiple polypoid lesions are more suggestive of benign or inflammatory aetiology.

Histopathology	Frequency	Size range (mean, median)
XCC	7	4.2–10 mm (5.7 mm, 5 mm)
XCC and adenomyomatosis	1	5.1 mm (5.1 mm, 5.1 mm)
XCC and adenomatous polyp	0	N/A
Chronic cholecystitis	5	2–10 mm (5.5 mm, 4.2 mm)
Chronic cholecystitis and adenomyomatosis	1	13 mm (13 mm, 13 mm)
Acute gangrenous cholecystitis	1	5 mm (5 mm, 5 mm)
Malignant	0	N/A
Total	15	

63 (68%) patients who suffered subsequent biliary episodes were referred to secondary care: 37/43 (86%) of these to general surgery and 6/43 (14%) to gastroenterology.

Surgical management

There was a difference in the way individual surgeons managed polypoid lesions, with some veering towards



Figure 5 Ultrasound image of the gallbladder with a 17.3mm polypoid lesion in the superior wall. This was proven to be malignant on cholecystectomy.

cholecystectomy, others towards follow-up ultrasound to ensure that the “polyp” had not grown, and some towards discharge due to impressions of insignificance. The cholecystectomy rate for patients under surgical care was 42% (43/103). Electronic [Supplementary Material Appendix S1](#) lists the actions of individual surgeons. Note that not all patients were referred to general surgery and that sometimes information was unavailable.

Discussion

Adherence to published guidance

The present study supports the hypothesis that gallbladder polypoid lesions are variably managed. Best practice dictates that any polypoid lesion >10 mm should be treated with laparoscopic cholecystectomy. This guidance was not well adhered to in this study: only 6/10 (60%) of patients with lesions >10 mm were treated with cholecystectomy with malignancy risk often cited as the reason.

The other aforementioned recommendations dependent upon polypoid lesion size and patient characteristics were much more difficult to assess. This is because the vast majority of reports did not specify an exact size when it was <10 mm and 18% of reports did not state a measurement at all. Furthermore, this study only evaluated patients with biliary symptoms.

That any polypoid lesion in the presence of biliary dyspepsia (or any symptoms suggestive of a biliary source) should be treated with laparoscopic cholecystectomy regardless of size was not well adhered to: only 30/244 (12%) after initial presentation or 43/244 (18%) overall. Although there are a number of potential reasons for this (e.g., patient choice, patient not fit for surgery, patient treated for other causes, resolution of symptoms), a rate of 18% is low. This could be due to a combination of factors, which will be discussed sequentially.

Radiologists/sonographers' reporting of GPL and the possible effect on GP actions

Radiologists/sonographers seem to focus their report on ruling out the possible malignant nature of the noted findings. This manifested in a high proportion of reports not commenting on the polypoid lesions (30%), stating insignificance (14%), or suggesting no follow-up required (2%). This problem was exacerbated by the fact that 98% of ultrasound reports described the gallbladder polypoid lesions as polyps, with no obvious appreciation that as well as true polyps these could be adherent gallstones, biliary sludge, cholesterol polyps, adenomyomatosis, or inflammatory polyps, and thus potentially responsible for the patient's symptoms. Additionally, there was no appreciable difference in reporting by radiologists versus sonographers, although it must be noted that only 11% of the reports were from radiologists.

The majority (75%) of referrals to abdominal ultrasound were from GPs. A report deeming the findings insignificant would undoubtedly lead to fewer referrals to a surgeon, and

thus reduce the chances of definitive management of the patient's symptoms. Indeed, 107/184 (58%) of patients were not referred to secondary care, which may partly be responsible for the 63/244 (26%) of patients who presented at a later date with biliary symptoms.

Variations in surgical management

There were clear variations in the way that individual consultant surgeons managed a patient with polypoid lesions. Some veered towards cholecystectomy, others towards follow-up ultrasound to ensure that the "polyp" had not grown, and some towards discharge due to impressions of insignificance.

Although cholecystectomy is not the only management option for patients under surgical care with biliary symptoms, a rate of 42% (43/103) is quite low considering that every patient included in the study presented with symptoms suggestive of a biliary source. The very high rates of XCC and chronic cholecystitis discovered histologically post-cholecystectomy suggest that it was the correct course of action in the patients that underwent surgery.

These results suggest a lack of a uniform strategy for managing gallbladder polypoid lesions.

High proportion of XCC

XCC is an uncommon subtype of chronic cholecystitis with a reported incidence of $\leq 10\%$ ^{14,15}; however, in this study XCC formed 27/40 (68%) of all histological chronic cholecystitis cases (8 males, 19 females, mean age 60 years, all Caucasian). This suggests that there is a higher likelihood of the XCC variant in patients with GPL discovered at ultrasound. These findings concur with a previous study that histologically examined 23 gallbladders post-cholecystectomy and reported "cholesterol polyps" as being the most common "polyps".¹⁶ The present authors have assumed this to mean XCC as being the most common GPL.

Correlation of ultrasound findings with histopathology

Among the seven polyps considered significant by size criteria (>10 mm), only one (2%) was proven malignant, which is in keeping with published reports of their extremely low incidence.^{7,17} It is observed that a single lesion is more likely to suggest the presence of malignancy. This would corroborate with previous reports of multiple polyps being more indicative of a non-neoplastic pathology and single polyps more likely to represent neoplastic processes.^{18,19}

Given that only a small proportion of the ultrasound reports identified gallstones, this correlates well with widely published and accepted reports that small adherent hyper-echoic lesions are difficult to differentiate from small polyps (Figs 6 and 7). Although most ultrasonologists are aware of this, referring clinicians often misinterpret reports that mention "polyps" as true lesions or vice versa. As previously mentioned, this leads to inconsistent specialist referrals and follow-up. Although the entire cholecystectomy cohort of 42 patients had ultrasound reports that were



Figure 6 Ultrasound image of the gallbladder, with an adherent hyper-echoic wall lesion measuring 4.4 mm. This was not a polyp on cholecystectomy, and highlights the diagnostic dilemma of the ultrasonologist.



Figure 7 Ultrasound image of the gallbladder in two planes. Despite its size (11.4 mm), the hyper-echoic lesion appears adherent to the gallbladder wall with no post-acoustic shadowing. Histopathology did not demonstrate a polyp, and once again highlights the diagnostic challenge for the ultrasonologist.

not grossly discrepant, they were inconsistent. This study has demonstrated that these forms of reporting techniques are inadequate. A further standardised more accurate reporting process is suggested, that would either describe a hyperechoic lesion as such (stating the uncertainty in diagnoses),²⁰ or as a polypoid lesion (as per the ESGAR guidance).¹³

Although this is a historic study analysing reports that were written years prior to the 2017 guidelines, it holds valuable lessons regarding the authors' recent observations of lack of improvement regarding descriptions and recommendations. It additionally puts the 2017 guidelines into context and highlights its clinical importance.

In conclusion, GPL tend to be misnamed as polyps by the reporting radiologists and sonographers, and a large proportion of reports deem the findings as insignificant. These comments will likely result in fewer secondary care

referrals by GPs who need to be educated in the meantime not to rely solely on radiologist/sonographer comments when confronted with findings of “polyps” on ultrasound, or more correctly GPL. In addition, radiologists/sonographers also need to be aware that polypoid lesions are not the same as polyps and can indeed be responsible for the patient’s symptoms. Surgeons additionally have different approaches to polypoid lesions and a uniform management strategy needs to be applied. These factors contribute to delays in definitive therapy and possibly lead to a more complicated presentation.

Conflict of interest

The authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.crad.2019.02.009>.

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