Medical audit

The fate of gallstones: traditional practice questioned

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Aims: Gallstones are traditionally handed back to patients as a souvenir of their cholecystectomy. The aim of this study was to review the potential hazards of this practice, the final fate of gallstones and the patients' perception of the risks.

Patients and Methods: A total of 86 consecutive patients undergoing cholecystectomy for cholelithiasis were surveyed prospectively. An unrestricted Medline database search was performed to gather pertinent literature.

Results: Of the 86 patients studied, 64% took their gallstones home, out of whom 29% actually handled the stones. In 9%, gallstones were accessible to children. Of all patients surveyed, 19% thought that the stones could be harmful. No patient received any information about the potential risks. Of the study group, 35% had discarded their stones by 6 weeks and 16% were planning to discard them. The rest were unsure or had decided to keep the stones.

Conclusions: Available literature establishes the presence of viable pathogenic bacteria in gallstones, but their infective potential is unknown. These bacteria are possibly more pathogenic than similar gut flora. This study has shown that gallstones are handled by a significant number of patients and are even accessible to children. The majority of patients do not consider them harmful and no information is provided to them. In this age of increasing health awareness, we recommend that patients taking their gallstones home should be informed of the potential risks.

Key words: Gallstones – Bacteria – Infectivity – Hazard

It is a long-established, surgical tradition to hand gallstones over to the patients after their cholecystectomies. The fate of these gallstones has never been studied. It is well known that gallstones are frequently associated with bacteria although the infective potential of such gallstones has not been established. Handing gallstones over to patients could be potentially hazardous. The health implications of this practice may need to be assessed.

The objectives of this study were to: (i) analyse the final fate of gallstones given to the patients; (ii) review the

literature for potential hazards of this practice; and (iii) assess patients' perception of involved risks, if any.

Patients and Methods

A total of 86 consecutive patients undergoing cholecystectomy for gallstone disease in a single surgical firm were surveyed prospectively. As was the usual practice, gallstones retrieved from the gallbladders during the

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Figure 1 Questionnaire.

1. Did you take your gallstones home after your operation? Y/N
2. Were you given any special instructions regarding your stones? Y/N
3. Did you ask for any information regarding any hazard from the stones? Y/N
4. Do you think these stones could be harmful in any way? Y/N/don't know
5. Did you or anyone else touch or handle the stones? Y/N
6. Did any children have access to the stones? Y/N
7. Where are the stones now? _____
8. What do you plan to do with them if you still have them? _____

Y, yes; N, no. Please encircle your choice.

operation were washed in tap water, placed in a universal pot, and sent to the ward with the patient.

Patients whose gallbladders contained only sludge or gravel and no formed stones, obviously did not receive any stones. The same was the case with patients whose stones were crushed to facilitate gallbladder extraction during laparoscopic operation.

Once on the ward, the stones in their pot (Fig. 2) remained with the patient, until discharged. None of the ward staff were aware of this study and no change was made in the traditional protocol regarding these stones.

All patients were seen in the clinic 6 weeks after their operation, when they were asked to answer a questionnaire (Fig. 1). All patients were informed regarding this study prior to answering the questionnaire and explained that they could decline to participate.

The data from the 86 questionnaires were analysed systematically. Pertinent literature was gathered from the Medline database using 'gallstones', 'bacteria', and 'infection' as the keywords. Additional material was obtained from references cited in the original papers retrieved.

Results

The study group was 86 consecutive patients undergoing cholecystectomy for cholelithiasis. The male:female ratio was 18:68. The mean age for males was 64.5 years (range, 42–87 years) and that for females was 51 years (range, 17–90 years). Of the 86 patients studied, 55 were given the stones. The remainder did not receive stones because either the stones were crushed during operation or were in the form of sludge. All patients who were given the gallstones took them home on discharge. All patients attended a 6-week follow-up appointment and answered the questionnaire. Those patients who did not receive the stones were asked to answer only question four from the questionnaire.

Of the studied patients, 19% thought that the stones could be harmful in some way, 68% thought that the stones would not be harmful in any way and 13% were not sure if the stones could be harmful.

None of the patients who took their gallstones home, asked for any specific information regarding the stones. Similarly, the hospital staff provided no specific information regarding the stones or any potential hazard from them.

Of the patients who took their gallstones home, 29% actually handled the stones. Gallstones were accessible to children in the homes of 9% of patients.

A total of 35% of the patients had disposed off their stones by 6 weeks after the operation and another 16% were planning to do the same. Household rubbish was the most popular site for disposal, though some stones ended up in the garden or the sea. The rest of the patients (49%) had decided to keep the stones or were still undecided about the fate of their stones at the end of 6 weeks. Interestingly, one patient was considering ornamental use of her stones.

Discussion

*Moynihan's aphorism: a gallstone is a tombstone erected to the memory of the organism within it.*¹

Available literature establishes that various viable pathogenic bacteria that can be cultured *in vitro* are present in gallstones.²⁻⁴ Scanning electron microscopy of fresh stones has revealed bacterial microcolonies on the gallstone surface as well as in the interior of pigmented gallstones.⁵ More significantly, some studies have demonstrated viable bacteria present on gallstones which can be cultured *in vitro*. In their study, Wetter *et al.*² found that *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Enterococcus* spp. were the commoner organisms grown from crushed gallstone

Figure 2 Washed gallstones in their pot

cultures. Similar results were established by Leung *et al.*⁴ and Swidsinski *et al.*³ Using quantitative polymerase chain reaction, Swidsinski *et al.*³ showed that the bacterial concentration on stones with positive bacterial cultures was 10^4 – 10^5 colony forming units (CFUs)/10 mg of stone weight. The majority of bacteria cultured from the gallstones *in vitro* are common pathogens *in vivo*.

Another infectious pathogen associated with gallstones is *Salmonella* spp. In regions endemic for typhoid, *Salmonella* is often found in the diseased gallbladders of carriers. Lai *et al.*, from Hong Kong, have shown how a chronic carrier state resistant to several courses of antibiotics was eradicated only after removal of gallstones.⁶ This may suggest that gallstones not only harbour *Salmonella* spp. but perhaps also impart antibiotic resistance in some way.

Gallstone-related bacteria are morphologically different from their native gut counterparts and have P1 fimbriae which make them stronger biliary pathogens.² Electron microscopy of gallstone-related bacteria has also shown them to be covered in biofilms, which perhaps allows them to survive in the hostile biliary environment and also impart antibiotic resistance.^{4,7} We think there is a

reason to believe that morphological modifications in gallstone-related bacteria make them superior pathogens if compared to their native gut counterparts.

From our study, the majority of the patients did not feel that their gallstones could be harmful in any way. Stones were actually handled by a sizeable proportion of patients and sometimes these gallstones were accessible to children. All this could be potentially hazardous behaviour. It was also evident that the healthcare providers failed to inform patients about any potential risks. Having said this, there is at present no reliable evidence to suggest that gallstones are harmful once removed from the body. In our literature search, we did not find any studies to demonstrate the actual infective potential of such gallstone-related bacteria or any evidence that they are harmless. Further research is also required to show how soon these bacteria lose their viability in the relatively dry environment of the gallstone *in vitro*.

Conclusions

Viable pathogenic bacteria are often present on gallstones. These bacteria are possibly more pathogenic than similar gut flora. In our study, we found that patients undergoing cholecystectomy had access to their stones almost immediately after the operation. A significant number of patients handled the stones and some stones were even accessible to children. Further studies are needed to ascertain the infective potential of such stones. In this age of increasing health awareness and litigation, we recommend that patients taking their gallstones home should be informed of the potential risks.

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