



Opinion

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The Role of Prophylactic Antibiotics in Laparoscopic Cholecystectomy

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The inappropriate or excess use of antibiotics is one of the biggest current threats to global health and there is therefore a drive to minimise antibiotic use including for prophylaxis. Peri-operative antimicrobial prophylaxis is administered prior to surgical procedures to prevent surgical site infections. The optimal anti-microbial agents for prophylaxis should be bactericidal, well tolerated, inexpensive, and active against the typical pathogens that cause surgical site infection post-operatively in the cohort being treated. Surgical site infections account for a significant proportion of healthcare associated infection. There are a large number of patient factors e.g. diabetes, chronic renal disease, obesity, etc. that can increase the risk of infection. Current recommendations suggest that prophylactic antibiotics should be administered where that risk of infection is high, where foreign material is implanted or where the risk of infection might be low, but the consequence of infection are high [1]. The optimal timing for the administration of prophylactic antibiotics is prior to any surgical incision but less than 120 minutes before [2]. The role of prophylactic antibiotics prior to laparoscopic cholecystectomy has been debated for many years. The incidence of surgical site infection post laparoscopic cholecystectomy is approximately 5% [3]. The presence of certain co-morbidities increases this risk but in addition, the presence of bacteria in the bile of patients undergoing cholecystectomy (culture taken at the time of surgery) occurs in more than 15% of patients [4]. In this study, it was possible to predict those patients who had a higher risk of a positive bile culture and generally, this was in those patients with an acute presentation with gallstone related disease. It has also been reported that a positive bile culture is associated with a higher risk of surgical site infective complications [5] but pre-operative bile culture is impractical and has risks associated

and is not recommended. Approximately 70,000 cholecystectomies are carried out annually in the UK each year [6] and there is wide variation in the practice of prophylactic antibiotic administration across the UK despite guidelines suggesting antibiotic prophylaxis is not necessary [7]. In a recent study, 30.8% of respondents routinely used prophylactic antibiotics prior to laparoscopic cholecystectomy; only 5.6% adhered to the current guidelines by not administering antibiotics while the remaining 63.7% used antibiotics selectively depending on operative findings [8]. We would argue that in this latter group, these are no longer prophylactic antibiotics but rather antibiotics given as a treatment and the optimal timing of administration has passed.

The published literature on the role of prophylactic antibiotics prior to laparoscopic cholecystectomy is mixed. In a meta-analysis involving nineteen randomized controlled trials between 1997 and 2015 and involving over 5000 patients surgical site infection occurred in 2.4% of patients receiving prophylactic antibiotics and 3.2% in patients who did not receive antibiotics [9]. The conclusion of this meta-analysis was that routine prophylactic antibiotics should not be used prior to laparoscopic cholecystectomy. Despite this study there, remained resistance to omitting prophylactic antibiotics prior to laparoscopic cholecystectomy and some of this resistance was based on opinion originating from the far east [10]. Two more recent meta-analysis have criticized previous studies for being underpowered. A systematic review and meta-analysis from Korea of over 12000 patients reported a small but significant reduction in superficial surgical site infection in the patients receiving prophylactic antibiotics compared with the patients who did not receive antibiotics [11]. The study concluded that even low risk patients undergoing laparoscopic cholecystectomy

benefit from prophylactic antibiotics. A further study from Japan has systematically reviewed and re-appraised previously reported meta-analyses, this study considered the previously reported meta-analyses statistically underpowered. The study included seven meta-analyses that included a total of 28 randomized controlled trials and over 7000 patients. The study reported that prophylactic antibiotics given prior to laparoscopic cholecystectomy significantly reduced the incidence of both surgical site and distant infection [12]. The authors accepted that their methodology could be open to bias and that the randomized controlled trials included in their study and the meta-analyses previously reported included patients from many different healthcare systems. It would therefore appear that the published data is conflicting, and no definitive answer is available.

It is likely that a selected cohort of patients benefit from antibiotic prophylaxis prior to laparoscopic cholecystectomy and based on the published data it should in theory be possible to predict which patients would benefit. It should be possible to predict which patients are likely to have complicated gallbladder disease and therefore a difficult cholecystectomy with the risk of bile or gallstone spillage [13]. In addition, it should be possible to add in those who are more likely to have a positive bile culture based on pre-operative assessment not direct culture [4] and finally those patients with co-morbidity likely to put them at risk of a surgical site infection [3]. This would include but not be limited to any patient who first presented as an emergency to hospital, those with a thick walled gallbladder on imaging, previous bile duct stones, biliary intervention, acute pancreatitis, acute cholecystitis, obese patients or those with diabetes, chronic kidney disease, liver cirrhosis or those on immunosuppressive medication of any type. In these patients, the operating team would need to predict and remember that they require a dose of prophylactic antibiotics and administer the dose in the anesthetic room during the induction of anesthesia. Identification per-operatively of those at higher risk with the subsequent decision to give antibiotics is less likely to be of benefit to the patient. The risks of this approach are that patients who are likely to benefit from prophylactic antibiotic administration are either going to miss out completely or receive their antibiotic at a sub-optimal time. In addition given the waiting times for elective surgery in the UK and the changing demography of patients with gallstone disease the number of patients who fulfil the criteria listed above is increasing. In our own practice, we continue to use prophylactic antibiotics prior to laparoscopic cholecystectomy based on the data presented in this manuscript. In addition, the logistics of identifying a large and increasing cohort of patients as described above and selecting to only give this cohort of patients [2] prophylactic antibiotics while not giving them to

the other patients seems unnecessarily meddlesome. The cost to the healthcare economy is likely to be greater in under-treating this population than over-treating. On this basis and until we have correctly powered and designed randomized data, we would encourage the continued use of prophylactic antibiotics in all patients prior to laparoscopic cholecystectomy.

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Conflict of Interest

No conflict of interest.

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