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COMMENT

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Acute cholecystitis and subtotal cholecystectomy

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Dear Editor,

We enjoyed reading the article by Toro A et al. [1], in which the authors reported a preliminary experience with a new technique to avoid subtotal cholecystectomy in acute cholecystitis. We would like to raise some interesting points and comments.

The authors reported that only three patients have undergone this technique in the last two years; this is a very small sample size for a trauma center service. Moreover, in the results section, the authors stated that "in the last 2 years from January 2019 to December 2021", but this time interval spans three years, not two.

The original French technique is characterized by four-ports insertion. We would like to inquire why the authors used three ports in acute cholecystitis, where laparoscopic surgery is undoubtedly more challenging. However, it has been demonstrated that there isn't any significant clinical benefit in using fewer than four-ports laparoscopic cholecystectomy compared to the standard four-ports approach during elective procedures. In emergency settings, the presence of dense fibrosis and inflammation of the hepatoduodenal ligament, as well as diffuse cholecysto-omental and cholecysto-duodeno-colic adhesions, may hinder proper exposure of the hepatocystic triangle when using only three ports. This increases the risk of iatrogenic biliary, vascular, and visceral injuries. In our opinion, under these specific conditions, the use of a fourth trocar is helpful to pull the gallbladder fundus upwards and facilitate wide exposure of the hepatocystic triangle, ensuring the safe dissection of Calot's triangle [2]. Moreover, the three ports approach may lead to subsequent medico-legal litigations in case of biliary iatrogenic injuries. Neverthless, while a four-port approach may offer better exposure, particularly in this specific technique and generally in difficult cases, experienced surgeons may opt for a three-port approach if they are confident in their ability to handle challenging intraoperative situations. In such cases as patients with transhepatic percutaneous cholecystostomy, the three-port approach may be useful and sufficient without the need for a fourth trocar. Surgeons should feel empowered to adapt their approach based on intraoperative findings and should not hesitate to add an additional port at any time if they encounter difficulties during dissection.

Another technical comment is related to trocars' size: the authors used two 5-mm operative trocars. Using a 5-mm clips applicator on an inflamed and edematous cystic duct in acute cholecystitis can indeed pose some challenges and risks, such as difficulties in performing a reconstituting subtotal cholecystectomy where the use of a linear endostapler might be necessary. There is also a risk that the clips may not securely close the cystic duct due to the tissue's condition, potentially leading to postoperative cystic duct leakage. One important point to emphasize is that the endostapler is a useful tool in certain critical scenarios, but it should only be considered and used once the correct identification of anatomical structures has been made, to minimize the risk of iatrogenic biliary and vascular injuries.

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Gallbladder inflammation in acute cholecystitis typically affects all layers of the gallbladder wall, so we don't understand the rationale for separating the outer layer from the inner layer in this technique. However, in gangrenous cholecystitis, the inflammation may extend to the gallbladder infundibulum-cystic duct junction, making cystic duct closure challenging and posing a high risk of biliary leakage.

Furthermore, we believe that the complete separation of the inner mucosal-muscular layer from the outer serosal layer, as described by Toro A et al., has only a theoretical basis. It is not feasible or practical and is more complex compared to other technical options already described, including the commonly performed rescue subtotal cholecystectomy by surgeons worldwide in cases of severe acute cholecystitis [3]. We believe that further validation of the technique through larger studies is needed before considering its widespread adoption.

Another question arises regarding what Toro A and colleagues suggested, namely cutting the entire gallbladder wall transversally using a monopolar hook. It is a well-known fact and a common experience among skilled surgeons that the diffuse thermal effect of monopolar energy leads to the coagulation and shrinkage of all tissues, inevitably resulting in the fusion of the layers described by the authors as the 'external serosa and internal muscular layer'. Therefore, it would be advisable to cut the gallbladder wall using cold scissors for a sharp transection of the different layers, with the hope of being able to identify and separate them as suggested. To our opinion, the technique described in the article presents a high risk of gallbladder infundibulum perforation when using a monopolar hook, particularly in areas with wall necrosis. In cases where a thick-walled gallbladder is adherent to the duodenum or the lateral wall of the common bile duct, a subserosal dissection may be preferable as a possible salvage strategy [4]. However, this should be done using blunt dissection with « duckbill » forceps to clear fat and fibrous tissue around the infundibulum-cystic pedicle or by using irrigation and suction with a hydrodissection effect.

We also do not understand the meaning of identifying the cystic duct from inside the "inner gallbladder wall" because we are not aware of distinct inner and outer gallbladder walls. We are only familiar with the anterior or posterior gallbladder wall, or at most, the inner and outer layers of the wall. We emphasize these seemingly "unusual" or unheard-of definitions, such as "inner gallbladder wall" and "anterior vessels," as they may unfortunately lead to confusion regarding gallbladder anatomy, particularly for young surgeons and residents. Anatomically and sonographically, the gallbladder wall consists of two layers: an inner hypoechoic layer (muscolar layer) and an outer hyperechoic layer (serosal layer). Therefore, the term 'inner gallbladder wall' may be misleading. Moreover, the term «anterior vessels» is also confusing. What does it refer to? Sometimes, the cystic artery may have an anterior superficial branch, which can be variably close to the cystic duct, and a posterior deep branch that often runs parallel to the gallbladder bed. In the article by Pesce A et al. [5], the most common variants of cystic artery anatomy are clearly described, such as a single cystic artery coming from right hepatic artery, the presence of two arterial branches (superficial and deep), a single short cystic artery originated from caterpillar right hepatic artery, long single cystic artery not from right hepatic artery crossing anterior to the common hepatic duct, double cystic artery/accessory cystic artery, a cystic artery seen more anteriorly than posteriorly in relation to Mascagni's lymph node, a constant vessel found on the postero-lateral margin of gallbladder bed, cystic artery coming from gastroduodenal artery, passing outside Calot's triangle. So, to our opinion, the right and deep knowledge of vascular anatomy during laparoscopic cholecystectomy for acute cholecystitis is mandatory.

The exact indications for this technique are unclear; the three treated patients presented with grade II moderate acute cholecystitis according to the Tokyo guidelines. In Fig. 2 of the manuscript by Toro A et al. [1], a case of gangrenous acute cholecystitis is clearly depicted. Moreover, the cystic duct appears easily recognizable and seems to be safely dissected. Furthermore, this technique is not novel; it resembles a subserosal dissection of an inflamed, thick-walled gallbladder with dissection around the gallbladder's infundibulum. In 2020, Nassar AH et al. [4] already suggested and analyzed possible salvage strategies when achieving the critical view of safety is challenging due to difficult anatomy or pathology.

The four types of subtotal laparoscopic cholecystectomy described and proposed in the discussion section are none other than the two techniques "fenestrating" and "reconstituting" described by Strasberg S et al. [6] in 2016, with the variant linked to the amount of gallbladder that is left attached to the liver.

Another comment arises from the absence of mention of ICG (indocyanine green) real-time imaging to better understand the intraoperative anatomy of the extrahepatic biliary system and ensure that the dissection remains safely away from the critical structures in the Mc Elmoyle danger zone [7].

When dealing with difficult acute cholecystitis, especially in cases where there is severe inflammation, fibrosis, or anatomical distortion, performing a subtotal cholecystectomy can be a safer alternative to a total cholecystectomy. Although this approach can prevent dangerous complications, such as biliary injury, it may lead to biliary fistulas or the presence of residual stones. In such cases, the patient may require endoscopic treatment,

reoperation, and prolonged hospitalization, which may result in medico-legal issues. Very rarely, conversion to open surgery is performed, even though it could reduce the number of subtotal cholecystectomies [8]. However, the decision must be carefully weighed, and the approach tailored to the individual patient's condition and intraoperative findings.

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