Improvised laparoscopic stone picker

Akhilesh Kumar Agarwal · Nirjhar Bhattacharya · Anshu Agarwal

Received: 13 July 2008 / Accepted: 21 October 2008

Abstract Laparoscopic cholecystectomy is the treatment of choice for calculus cholecystitis. It is frequently complicated by stone spillage and retrieval of these stones is a cumbersome process which is frequently complicated by injuries. Moreover left over stones frequently leads to complication. We have hereby improvised a laparoscopic hand instrument which quickly and easily recovers intra-abdominal free and scattered gall stones with a loss of little bit of intra-abdominal CO₂. This stone picker was applied in over 50 cases with successful recovery of stones and a mean loss of about 0.1 Lts of carbon dioxide gas.

Keywords Laparoscopic cholecystectomy · Stone spillage · Stone picker

Introduction

There is spillage of stones inside the peritoneal cavity during laparoscopic cholecystectomy due to iatrogenic perforation of gall bladder, particularly in the beginners' hand. Moreover, in laparoscopic choledocholithotomy, extracted stones from the bile duct are deliberately dropped inside the peritoneal cavity before taking them out. These stones have to be removed as these may lead to complications as adhesion, obstruction, or intra-abdominal sepsis. Normally these stones are dealt with individually either with a spoon forceps or collected in a retrieval bag and ultimately recovered through one of the wider ports. These procedures are time consuming and monotonous. Some times these procedure is complicated by injury to omentum or gut. We have devised a retrieval system which utilises increased intra-abdominal pressure to extract these stones.

A. K. Agarwal¹ · N. Bhattacharya² · A. Agarwal³
¹Clinical Tutor, Calcutta Medical College,
Kolkata, India

²Associate Professor, Bankura Medical College,
Bankura, West Bengal
India

³GSVM Medical College,
Kanpur, UP
India

A. K. Agarwal (✉)
E mail: akhil2u@rediffmail.com, akhil_g_2002@yahoo.com

Fig. 1 Materials required to construct stone-picker

Materials and methods

To make the stone picker we need the following (Fig. 1):

1. 10 mm suction-irrigation pipe only.
2. One Maelecot catheter (No. 30/32).
3. One small plastic container with air tight cap.

Preparation of the stone picker (Fig. 2)

With the help of the hot metal perforator a small hole of approx. 3 mm diameter is made on the cap of the plastic container. A second hole of approx. 10 mm diameter is made on the side wall of the container. A small length of rubber tube (Indian rubber, Maelecot catheter) of suitable diameter is fitted tightly with the outer end of the 10 mm suction-irrigation pipe while the other end is inserted in to the plastic container through the tightly fitting hole at its side wall.

Technique (Fig. 3)

The steps of extraction of stones are as following:

1. The small hole in the cap of the container (air vent) is to be closed with the right index finger.

Fig. 2 Improved laparoscopic stone-picker

Fig. 3 Line diagram of technique

2. 10 mm pipe is to be inserted through the 10 mm (ID) canula inside of the abdomen and its tip should be placed near the stone to be extracted.
3. The index finger closing the air vent is to be removed to open up the hole. As the intra-abdominal pressure is high there is a gush of air through the canula which takes the stone out with the gush. This escape of intra-abdominal gas is stopped by blocking the air vent by index finger. As this system is not connected to any sucker there is no negative pressure and the chance of injury is negligible.

With the sound of the striking stone in side the container, the air vent is to be closed quickly to prevent unnecessary escape of intra-abdominal carbon dioxide.

With this technique most of the stone less than 10 mm can be vented out. Larger stones are crushed and then they can be dealt in the same manner.

This whole setup can be sterilised 2% Glutareldehyde or formaline chamber as done with other laparoscopic instruments.

Result

The instrument used in 50 occasions to recover spilled out stones from abdomen laparoscopically from July 2002 till date. Stones having less than 9 mm diameter extracted with in a fraction of a second in 39 occasions with mean loss of 0.1 lit. of CO₂ per stone. Stones more with diameter more than 10 mm had to be crushed in to small pieces, on the omental surface with 'Claw forceps' before their extraction by this technique and that took a mean time of 4.3 minutes for each of them and mean loss of CO₂ 1.2 lit. per stone in those 11 surgical situations. If there are multiple stones to recover, flow rate of the 'Carbon dioxide Insufflator' is to be elevated to 10 lit. / mint. to prevent collapse of the abdomen due to associated gas escape during this technique.

As there is no pulling effect as in case of negative pressure by sucker there is no change of entrapment of viscera and hence there is no chance of injury.

Discussion

Laparoscopic cholecystectomy is the gold standard technique for treatment of calculus cholecystitis. During the process frequently the gall bladder gets ruptured and the stones are scattered. These scattered stones frequently lead to complication as intra-abdominal abscess [1–3], adhesion between loops of gut complicating as obstruction etc.

Retrieval of these stones is done either individually by picking the stones by forceps or by collecting them in a bag and taking them out. This takes time and also during picking the stones viscera get caught in the forceps and get injured.

Due to peritoneal pneumatisation, the intra-abdominal pressure is usually in between 10–14 mm of Hg. Therefore, when we allow escape of carbon dioxide by opening up the ‘air vent’ of this instrument, there is an intra-abdominal turbulence of carbon dioxide which picks up the nearby stone, like ‘tornado’, through the 10 mm pipe and is trapped inside the container.

If extraction of the stone is the only requirement, then a 10 mm suction – irrigation canula will serve the purpose by blocking and releasing ‘outer end’ hole with a finger; but then stones are to be collected from the patient’s draping or floor of the operation theatre (Fig. 3).

Therefore, the developed instrument and its application has proven to be very simple, easy, economic and techni-

cally faster in recovery of intra-abdominal scattered gall stones.

References

1. Casillas S, Kittur DS (2003) Late abscess formation after spilled gallstones masquerading as a liver mass. *Surg Endosc* 17(5):833
2. Tumer AR, Yuksek YN, Yasti AC, Gozalan U, Kama NA (2005) Dropped Gallstones During Laparoscopic Cholecystectomy: The Consequences. *World J Surg* 29:437–440
3. Koc E, Suher M, Oztugut SU, Ensari C, Karakurt M, Ozlem N (2004) Retroperitoneal abscess as a late complication following Laparoscopic cholecystectomy. *Med Sci Monit* 10(6):CS27-9