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Review Article

Anatomical principles of intraperitoneal drain placement

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ABSTRACT

Drain placement after abdominal surgery continues to be a standard practice. However in recent years there has been reluctance amongst surgeons to drain the peritoneal cavity liberally thereby leading to a multitude of septic complications. A brief review of the physical dynamics of intraperitoneal spaces is presented with a view to improve the practice of optimum drain placement.

Keywords: Cavity, Drain, Peritoneal, Tube

INTRODUCTION

The peritoneal cavity is a complex space with a variety of anatomical variations. Dependent areas in the peritoneal cavity need to be identified in order to ensure adequate drainage of the cavity. The attending surgeon is confronted with cases of perforative peritonitis which not only requires prompt surgical intervention but also optimum and adequate drainage of the dependent spaces. The various intraperitoneal spaces are discussed with a view to identify best points for drainage.

SURGICAL ANATOMY

The peritoneal cavity has a complex arrangement of peritoneal reflections thereby dividing it into intra and extra peritoneal spaces.[1]

Fluid accumulation in intraperitoneal spaces is guided by gravity into the most dependent areas. Whereas many a times extra peritoneal spaces are also involved by fluid collections rendering drainage difficult.

The peritoneal cavity has 4 intraperitoneal spaces-

Left anterior intraperitoneal space

This is also described as the left subphrenic space. It is bounded above by diaphragm and behind by the left triangular ligament, left lobe of liver, gastrohepatic omentum and anterior surface of the stomach. To right is the falciform ligament and to the left, the spleen, the gastrosplenic omentum and diaphragm. Common causes of abscess formation and fluid collection in this space is after surgery of stomach, pancreatic tail, spleen or splenic flexure of colon.[2]

Left inferior intraperitoneal space (Left subhepatic space)

This space is also described as lesser sac of peritoneum. It is cul-de-sac which communicates with greater peritoneal cavity through the foramen of Winslow. It is entirely retrogastric in location.

The commonest cause of fluid collection in this space is acute pancreatitis. Perforation of the posterior stomach wall can also lead to fluid collection in the lesser sac thereby masking conventional signs of perforative peritonitis.[3,4]

Right superior intraperitoneal space (Right subphrenic space)

It lies between right lobe of liver and diaphragm. It is limited posteriorly by anterior layer of coronary and right triangular ligament and to the left by the falciform ligament. Common causes of fluid collection in this space are peforated duodenal ulcer, cholecystitis or duodenal stump blowouts.[2]

Right inferior intraperitoneal space (Right subhepatic space)

It lies transversely beneath right lobe of liver in the Morrison's pouch. It is bordered on the right by the right lobe of liver and diaphragm. To the left is the foramen of Winslow and below is the duodenum. In front are the liver, gall bladder and behind the upper part of right kidney and diaphragm. It is bounded below by the transverse colon and hepatic flexure. This happens to be the deepest space and therefore the commonest site for a subphrenic abscess.[5-7]

EXTRAPERITONEAL SPACES

These are 3 in number.

Right and left extraperitoneal spaces which are best described as periphrenic spaces. Mid extraperitoneal space is another space which is best described as the bare area of liver. This area is usually affected in cases of amoebic hepatitis or pyogenic liver abscess.

The intraperitoneal spaces are interconnected by intricate patterns. The right subphrenic space communicates with subhepatic space. When these two spaces get filled with fluid, the extra fluid gravitates along the right paracolic gutter into the pelvis. However the communication on left side between the two left side spaces is quite different. The left subphrenic space does not communicate with the lesser sac whereas the left subphrenic space also does not communicate with left paracolic gutter due to the phrenicocolic ligament. However left paracolic gutter communicates with the pelvis. Being the most dependent part of the peritoneal cavity, the pelvis drains most of the fluid collections of the intraperitoneal cavity.[8] In the pelvis the anatomy in males involves only single pouch called the rectovesical pouch whereas in females, two pouches are found viz. uterovesical pouch anteriorly and rectouterine (Douglas) pouch posteriorly.[9]

PRINCIPLES OF DRAIN PLACEMENT

Drain placement in the peritoneal cavity is pivotal for successful outcomes especially in cases of perforative peritonitis or in cases wherein extensive dissection with an accompanying anastomosis has been carried out.[10] Traditionally corrugated drains were used with the logic that the chance of blockage was least. However, postoperative management of corrugated peritoneal drains may at times become messy, thus precluding their use. Tube drains are therefore the best choice despite the calculated risk of blockage. Negative suction tube drains are best avoided as they can cause bowel perforations because of high negative force.[11,12] Therefore a combination of a corrugated with an ordinary tube drain is the most ideal pattern for intraperitoneal drainage.[13]

Having made a choice of the type of drain to be used, positioning of the drain is then the most critical decision to be taken by the surgeon depending upon the merits of each individual case.[14] If surgery involves the supracolic compartment, then with respect to the right side, a drain in Morrisons pouch will suffice. However, if there has been significant mobilization of right lobe of liver for right sided liver pathology, then a right subphrenic drain is also advisable. If both spaces are to be drained concomitantly, care should be taken to bring both drains out through separate incisions. If surgery involves the right colon, the drain may be placed in right paracloic gutter with another drain in the pelvis.

On the left side, a subphrenic drain is advisable especially in cases of upper gastrointestinal surgery or a splenectomy. Lesser sac drainage is best done through the gastrocolic omentum as seen in cases of infected pancreatic necrosis.[3] For left colonic surgery, left paracolic gutter can be drained by placing a tube in it. However, if one anticipates extensive drainage, an accompanying pelvic drain will be advantageous.

Placement of drain should be as liberal as possible.[12] This ensures complete evacuation of any collections, thereby reducing the morbidity and mortality of the septic process to a bare minimum.[14]

CONCLUSION

Awareness of the intricate anatomy of intraperitoneal spaces is pivotal for adequate and optimum placement of drains. Liberal usage of intraperitoneal drains is a significant factor for decreasing morbidity and mortality after major intraabdominal surgical procedures to a bare minimum.

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REFERENCES

1. Petrowsky H, Demartines N, Rousson V, Clavien PA. Evidence-based value of prophylactic drainage in gastrointestinal surgery: a systematic review and

meta-analyses Ann Surg. Ann Surg. 2004;240(6):1074-84.
2. Vagholkar K. Pawanarkar A, Yadav B, Deshpande A, Vagholkar S. Laparoscopic drainage of sub phrenic abscess. IJRMS. 2016;4(9).4192-4.
3. Vagholkar K, Singhal A, Pandey S, Maurya I. Pancreatic necrosectomy: When and How? Inter J Surg. 2013;30(4).
4. Strobel O, Büchler MW. Drainage after pancreaticoduodenectomy: controversy revitalized. Ann Surg. 2014;259:613-5.
5. Tanaka K, Kumamoto T, Nojiri K, Takeda K, Endo I. The effectiveness and appropriate management of abdominal drains in patients undergoing elective liver resection: a retrospective analysis and prospective case series. Surg Today. 2013;43:372-80.
6. Vagholkar K, Pawanarkar A, Chougle Q, Vagholkar S. Surgery for intra-abdominal hydatid disease: a single centre experience. IJRMS. 2016;4(10):4241-5.
7. Sarr MG, Parikh KJ, Minken SL, Zuidema GD, Cameron JL. Closed-suction versus Penrose drainage after cholecystectomy. A prospective, randomized evaluation. Am J Surg. 1987;153:394-8.
8. Karliczek A, Jesus EC, Matos D, Castro AA, Atallah AN, Wiggers T. Drainage or nondrainage in elective colorectal anastomosis: a systematic review and meta-analysis. Colorectal Dis. 2006;8(4):259-65.
9. Vagholkar K, Pawanarkar A, Vagholkar S, Pathan K, Pathan S. Management of urinary bladder injuries. ISJ. 2016;3(2):468-70.
10. Sagar PM, Hartley MN, Macfie J, Mancey-Jones B, Sedman P, May J. Randomized trial of pelvic drainage after rectal resection. Dis Colon Rectum. 1995;38:254-8.
11. Reed MW, Wyman A, Thomas WE, Zeiderman MR. Perforation of the bowel by suction drains. Br J Surg. 1992;79:679.
12. Vagholkar KR. Healing of anastomosis in the gastrointestinal tract: (Reptrospective study of 35 cases) Bombay Hospital J. 2001;43(2):269-79.
13. Kehlet H, Wilmore DW. Multimodal strategies to improve surgical outcome. Am J Surg. 2002;183:630-41.
14. Vagholkar KR. Principles of surgical drainage. Surgery. 2000;4(12):45-7.

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