

Surgical drains

Surgical drains of various types have been used, with the best intentions, in different operations for many years^[1]. It is often open to question whether they achieve their intended purpose despite many years of surgery. There is a paucity of evidence for the benefit of many types of surgical drainage and many surgeons still 'follow their usual practice'. With better evidence, management of surgical patients should improve and surgeons should be able to practise based upon sound scientific principles rather than simply 'doing what I always do'^[2]. Lack of definitive evidence has not helped the resolution of some controversial issues surrounding the use of surgical drainage.

Indications

Surgical drains are used in a wide variety of different types of surgery. Generally speaking, the intention is to decompress or drain either fluid or air from the area of surgery. Examples include:

- To prevent the accumulation of fluid (blood, pus and infected fluids).
- To prevent accumulation of air (dead space).
- To characterise fluid (for example, early identification of anastomotic leakage^[3]).

Specific examples of drains and operations where they are commonly used include:

- Plastic surgery including myocutaneous flap surgery.
- Breast surgery (to prevent collection of blood and lymph).
- Orthopaedic procedures (associated with greater blood loss).
- Chest drainage^[4] ^[5].

- Chest surgery (with, for example, the associated risks of raised intrathoracic pressure and tamponade).
- Infected cysts (to drain pus).
- Pancreatic surgery (to drain secretions).
- Biliary surgery.
- Thyroid surgery (concern over haematoma and haemorrhage around the airway).
- Neurosurgery (where there is a risk of raised intracranial pressure).
- Urinary catheters.
- Nasogastric tubes.

Surgical drain management

Management is governed by the type, purpose and location of the drain. It is usual for the surgeon's preferences and instructions to be followed. A written protocol can help staff on the ward with the aftercare of surgical drains^[6].

Types of surgical drain

Drains can be:

Open or closed

- Open drains (including corrugated rubber or plastic sheets) drain fluid on to a gauze pad or into a stoma bag. They are likely to increase the risk of infection.
- Closed drains are formed by tubes draining into a bag or bottle. Examples include chest, abdominal and orthopaedic drains. Generally, the risk of infection is reduced.

Active or passive

- Active drains are maintained under suction (which may be low or high pressure).
- Passive drains have no suction and work according to the differential pressure between body cavities and the exterior.

Silastic or rubber

- Silastic drains are relatively inert and induce minimal tissue reaction.
- Red rubber drains can induce an intense tissue reaction, sometimes allowing a tract to form (this may be considered useful – for example, with biliary T-tubes).

General guidance for surgical drains

- If active, the drain can be attached to a suction source (and set at a prescribed pressure).
- Ensure the drain is secured (dislodgement is likely to occur when transferring patients after anaesthesia). Dislodgement can increase the risk of infection and irritation to the surrounding skin.
- Accurately measure and record drainage output.
- Monitor changes in character or volume of fluid. Identify any complications resulting in leaking fluid (particularly, for example, bile or pancreatic secretions) or blood.
- Use measurements of fluid loss to assist intravenous replacement of fluids.

Removal

Generally, drains should be removed once the drainage has stopped or becomes less than about 25 ml/day. Drains can be 'shortened' by withdrawing them gradually (typically by 2 cm per day) and so, in theory, allowing the site to heal gradually. Usually drains that protect postoperative sites from leakage form a tract and are kept in place longer (usually for about a week).

- Warn the patient that there may be some discomfort when the drain is pulled out.
- Consider the need for pain relief prior to removal.
- Place a dry dressing over the site where the drain was removed.
- Some drainage from the site commonly occurs until the wound heals.

- When to remove:
 - Drains left in place for prolonged periods may be difficult to remove.
 - Early removal may decrease the risk of some complications, especially infection^[7] .

Evidence and controversy

- There is insufficient evidence from randomised controlled trials (RCTs) to support the routine use of closed suction drainage in orthopaedic surgery. Further RCTs with larger patient numbers are required for different operations before definite conclusions can be made for all types of orthopaedic operations^[8] ^[9] ^[10] .
- Nevertheless, the increasing application of evidence-based care has led to a diminution in the routine use of drains in orthopaedic surgery. One review studied eighty-six major orthopaedic operations. The authors concluded that postoperative wound drains make for a neat postoperative period with less tissue swelling, but no statistically significant differences between the drained and undrained wounds in terms of infection rates, haematoma or seroma formation^[11] .
- The routine use of drains may be abandoned in uncomplicated thyroid surgery. A systematic review found that the use of drains after thyroid surgery increases postoperative pain and length of hospital stay, with no decrease of re-operation rate, haematoma or seroma formation^[12] .
- The routine use of a closed suction drain is unnecessary after an uncomplicated total joint arthroplasty^[13] .
- There are insufficient studies which compare differing methods of chest drain clearance to support or refute the relative efficacy of the various techniques in preventing cardiac tamponade. The need to manipulate chest drains can neither be supported nor refuted by results from RCTs^[14] . One RCT did find that the implementation of active clearance of chest tubes reduced re-exploration and chest tube clogging in patients after cardiac surgery^[15] .
- The optimal time to remove drains after total joint arthroplasty is 24 hours^[16] .

- Pelvic drainage may act as an early detector of anastomotic leaks and reduce the need for re-operation in selected patients undergoing rectal cancer surgery^[3]. However, others consider that leaks usually occur after drains have been removed and that they are not useful in this way.
- Drain use after elective laparoscopic cholecystectomy increases wound infection rates and delays hospital discharge. Evidence to support the use of drain after the following procedures could not be found:
 - Laparoscopic cholecystectomy^[17]
 - Open cholecystectomy^[18]
- Evidence for drains reducing infection and haematoma formation after breast surgery is inconsistent^[19].
- Many gastrointestinal operations can be performed safely without prophylactic drainage. Drains should be omitted after hepatic, colonic or rectal resection with primary anastomosis and appendectomy for any stage of appendicitis^[20].
- A retrospective review found that even the complicated appendicitis (with secondary peritonitis and sepsis) in the modern era of antibiotics does not necessitate the use of prophylactic drain placement which, at times, may even prove counterproductive^[21].
- Prophylactic drainage is indicated after oesophageal resection and total gastrectomy^[20]. For many other gastrointestinal procedures (especially involving the upper gastrointestinal tract) there is a need for more research to clarify the value of prophylactic drainage^[20].
- A meta-analysis suggests that routine drainage after colorectal anastomoses does not prevent anastomotic or other complications^[22]. Damage may be caused by mechanical pressure or suction and drains may even induce an anastomotic leak.
- Drains are not a substitute for good surgical technique^[23].

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