

# Temporary Abdominal Closure

## Richard Davis, Sharmila Dissanaik

### Introduction:

There are several reasons why a surgeon would want to close the abdomen temporarily. Broadly, these fall under two categories: overall patient condition, and intra-abdominal condition. There is usually overlap among these two; patients with severe intra-abdominal conditions often have a severe illness and poor condition overall.

Patients with poor overall condition are those who are too sick for an extended operation: the appropriate treatment is “damage control.” When patients are in severe hemorrhagic or septic shock, an experienced surgeon will often decide in advance that the patient is in “damage control” mode. The focus becomes on controlling the bleeding or eliminating the source of sepsis and getting the patient to the ICU for further resuscitation and rewarming. Especially with hemorrhagic shock, you must get out of the operating room before the “lethal triad” sets in: hypothermia, acidosis, and coagulopathy.

In other situations, the patient’s condition deteriorates unexpectedly in the middle of a laparotomy, due to acute myocardial infarction, pulmonary embolism, or rarely, malignant hyperthermia. When the patient’s condition deteriorates, this type of closure helps you get the patient out of the operating room much faster.

Alternatively, sometimes it is an intra-abdominal condition that prevents you from closing the abdomen. One example is abdominal compartment syndrome. The intra-abdominal contents will not fit into the space that would remain after closure, due to edema. If you were to “force” this closure, the result would be the triad of abdominal compartment syndrome:

- Decreased ventilation due to pressure on the diaphragm,
- Low blood pressure due to decreased preload (pressure on the vena cava) and direct pressure on the heart itself,
- Low urine output due to decreased perfusion of the kidneys and direct pressure on them.

The surgeon will frequently be faced with bowels that are difficult to return to the abdominal

cavity, but it is rare for true abdominal compartment syndrome to become apparent during abdominal closure. If abdominal compartment syndrome seems likely, ask the anesthetist what is the peak airway pressure (at the end of inspiration) at the beginning of closure and then check it again at the end. If the pressure rises by more than 15cm H<sub>2</sub>O after abdominal closure, consider reopening and applying a temporary closure device, especially if the blood pressure has dropped during closure as well.

Regardless of the technique used for temporary closure, the sooner the patient returns to the operating room for definitive closure, the better. The surgeon should aim for return to OR within 24-48hours. Delays longer than 72hours, and certainly longer than a week, greatly increase the risk of failure to achieve primary fascial closure during the index admission. When an abdomen is left open, the abdominal wall muscles, without their insertion at the lateral edge of the rectus sheath, begin to retract laterally. This makes closure progressively more difficult. The longer the abdomen is left open, the greater the eventual difficulty. After 7-10 days, it may become impossible to achieve primary fascial closure, which greatly complicates the patient’s hospital stay and ultimate recovery. In addition, the longer the abdomen is left open, the greater the risk the bowel will become desiccated, or injured, and start to leak enteric contents. If this occurs, an “entero-atmospheric fistula” may occur; this is a catastrophic complication that can be more difficult to manage than the patient’s original diagnosis!

### Choice of closure technique

The goal of any temporary abdominal closure technique is to cover the intestines temporarily and to prevent excessive fluid and thermal losses from the open abdomen. In all cases these closures are to be considered temporary: the fascia should be reapproximated as soon as possible. In cases where the fascia is damaged, or fascial dehiscence has already occurred once or more, use the closure technique described in [Closure of Laparotomy Wound Dehiscence](#).

**Whenever possible** we favor the “Whipstitch” technique as described below.



# Temporary Abdominal Closure

Richard Davis, Sharmila Dissanaiké

Whipstitch is quick and easy to perform and requires no special supplies or training. It has the added benefit of covering intestine with the patient's own biologic tissue, rather than plastic or other synthetic substances that tend to cause more irritation. This technique is not suitable for use in compartment syndrome, although it works well for other indications for open abdomen.

**In cases where the skin edges cannot be brought together**, such as abdominal compartment syndrome, we recommend temporary vacuum closure as described in this article. This controls fluid drainage better, and causes less damage to the fascia, than the "Bogota bag."

The "Bogota bag" closure is a well known method. It consists of cutting a sterile IV fluid bag to the shape of the fascial incision and suturing it to the fascial edges. We usually do not use this technique because it takes more time to deploy than either of the two simple closure techniques described here. Another disadvantage is that the bag is sewn to the fascial edges, which damages them and makes definitive closure more difficult later.

However, if you do not have a large sheet of adhesive plastic or reliable continuous suction, and you cannot bring the skin edges together, this technique may be useful for temporary closure. Expect the abdominal incision to leak continuously, and plan to close the fascia as soon as you can.



The Bogota bag is an opened IV fluid bag sutured to the edges of the fascia. Suarez-Grau JM, Guadalajara Jurado JF, Gómez Menchero J, Bellido Luque JA, CC BY 4.0

<https://creativecommons.org/licenses/by/4.0> via Wikimedia Commons

Temporary abdominal closure generally occurs in the following steps:

- Decision: as described above, the patient's condition warrants temporary closure.
- Attempt to "Whipstitch" the skin together as described further below. Usually this technique is sufficient.
- If "Whipstitch" fails, placement of a sterile plastic barrier over the intestines
- Placement of two unfolded laparotomy sponges and a nasogastric tube within the skin incision
- Cleaning of the skin and placement of an adhesive sheet of plastic
- Applying suction to the nasogastric tube.

## Technique: "Whipstitch"

1. If it is possible to approximate the skin edges, bring them together in the midline with a large suture, such as 0 Nylon, in continuous running fashion.
2. The sutures should be placed approximately 1cm back from the skin edge, and spaced 1cm apart.



Using 0 Nylon or other monofilament on a cutting needle, suture only the skin together. The surgeon on each side of the patient begins at one end of the wound and the sutures meet in the middle. Tie the sutures together to complete the closure.

3. It is important to only suture skin and subcutaneous fat and leave the fascia untouched. This allows for a healthy fascial edge to be



## Temporary Abdominal Closure

Richard Davis, Sharmila Dissanaiké

preserved for definitive closure, to reduce the risk of subsequent hernia that is significant risk in these cases.

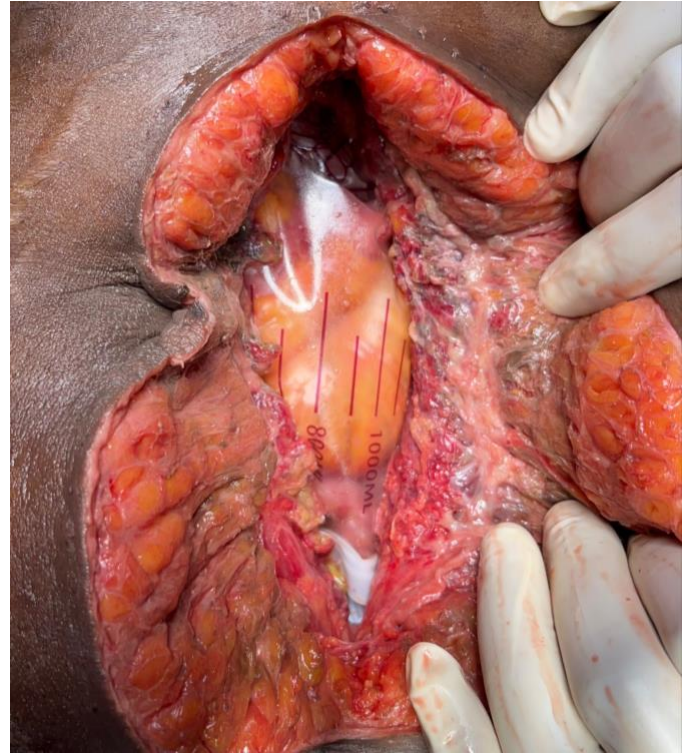
4. Since the whipstitch technique is more easily mistaken for definitive closure than other forms of temporary closure, it is recommended the surgeon label the patient's abdomen as open, either directly on skin or on the dressing, or both.



Writing on the dressing alerts the team that this is not an ordinary abdominal closure, despite its appearance.

### Technique: Temporary Vacuum Closure

1. Obtain a piece of plastic that is sterile: a sterile x-ray plate cover, some sterile inner packaging, or a urine bag that has been cut open. Also obtain a sheet of adhesive plastic; this does not need to be sterile though ideally it should be.
2. Pull the drapes back and thoroughly clean and dry the skin around the incision circumferentially for 15-20cm, including the inguinal folds. First clean with saline and dry the skin, then clean with alcohol and allow it to air dry.
3. The plastic sheet acts as a barrier to prevent the laparotomy sponge from coming in contact with the bowel. Lay it over the bowel, inside the peritoneal cavity, to overlap the edges of the incision.



A piece of sterile plastic is placed inside the abdominal cavity, between the bowel and the anterior peritoneum, overlapping the incision by at least 10cm. In this case, a sterile urine bag was cut on 3 sides and then unfolded.

4. Lay two laparotomy sponges in the wound. Do not place any part of them inside the abdominal cavity, they should be flush with the fascial edges only.



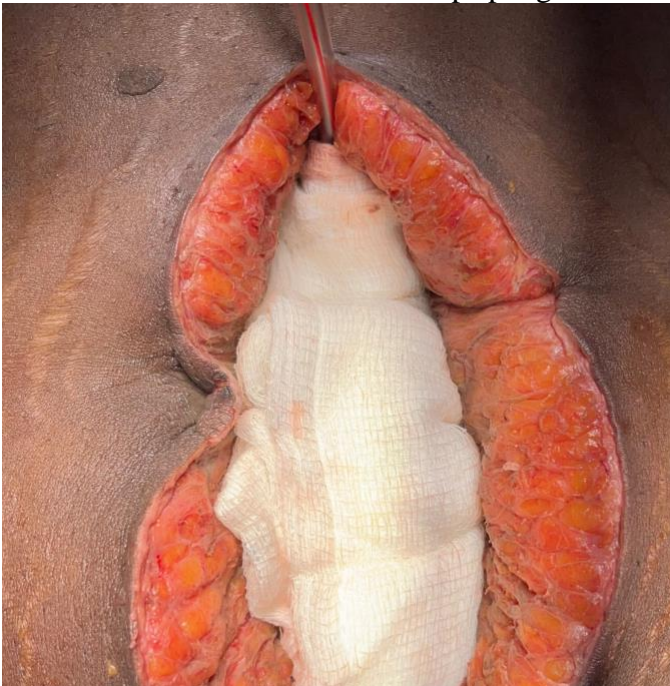


## Temporary Abdominal Closure

Richard Davis, Sharmila Dissanaiké

Laparotomy sponges are placed in the wound to cover the plastic. These lie in the wound but not inside the abdominal cavity, to decrease the chance that bowel will come in contact with the sponge material. It is not necessary to wet the sponges.

5. Lay an NG tube so that the holes on the end are within the folds of one of the lap sponges.



A NG tube is laid within the folds of the laparotomy sponge so that its holes are not in direct contact with either piece of plastic, to make it less likely that the tube's holes would become blocked.

6. Immediately before applying the adhesive sheet, check again that the skin is dry and that no further fluid has leaked out from the incision, or out of the ostomy if present. The skin should be clean and dry.
7. Lay a large adhesive sheet over the wound, overlapping the edges by more than 15cm if possible. Raise the NG tube off the skin a little so that it is completely encircled by the adhesive sheet to assure a good seal.
8. Connect the NG tube to suction. The lap sponges should collapse.



Adhesive plastic is applied over the whole abdomen. In this case, the plastic was applied directly over a colostomy, making sure the surrounding area was dry. The plastic over the colostomy was then trimmed and an ostomy appliance was applied directly to the plastic.

### Pitfalls

- Patients with temporary abdominal closure in place should ideally be kept intubated and sedated: a cough or strong Valsalva could disrupt the whole closure and result in evisceration. If you do not have an Intensive Care Unit, and you cannot transfer the patient to one while still intubated, your options are limited to heroic measures. In some settings the patient can be “bagged” by hand, but this must be sustainable for several days. Otherwise you may choose to take your chances and close the patient. In either case, they are unlikely to survive. Damage control laparotomy and temporary closure are essentially useless without ICU care.
- Temporary abdominal closure takes much less time than standard closure. If you do not

## Temporary Abdominal Closure

Richard Davis, Sharmila Dissanaiké

communicate well with the team, you may finish quickly, only to find that the ICU bed or transport equipment is not ready. Communicate early that you are in damage control mode so the team can plan the next steps accordingly.

- Over time, the lateral abdominal wall muscles retract and midline closure becomes progressively more difficult. Generally closure becomes impossible after 7 days. If the patient's condition has not improved enough to close the abdomen by then, you have no choice but to treat this as an open abdomen. Protecting the exposed small bowel is very difficult and requires very diligent nursing care.
- If a sheet of adhesive plastic is not available, this solution may be impossible. This closure depends on maintaining suction in the abdominal wound and removing fluids as they accumulate. We use kitchen plastic wrap (taped to the skin around the edges) for vacuum- assisted wound closure elsewhere in the body, but we have never used it in the abdomen. The Bogota bag, described briefly above, may also be used in this situation.

Richard Davis MD FACS FCS(ECSA)  
AIC Kijabe Hospital  
Kenya

Sharmila Dissanaiké MD FACS FCCM  
Texas Tech University Health Sciences Center  
Lubbock, Texas, USA

October 2022

