

## CASE REPORT

## Sandwich Mesh Abdominal Closure

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**Abstract:** The open abdomen carries a high mortality rate and represents a big surgical challenge. The recent introduction of vacuum assisted closure (VAC) introduced new techniques of its management, including STAR – Staged Abdominal Repair, Fabian Protocol, VAC supported with PDS, support with polyglactin mesh and the use of tissue expanders in the staged closure of the open abdomen. One of the methods, SMAC – sandwich mesh abdominal closure, emerged in April 2008 by the clinical group from Germany.

The authors present their own modification of SMAC and a case report, where it was used. By current literary research it was the first patient in the Central European hospital managed by SMAC VAC.

The authors of the article conclude that SMAC VAC and its modification is highly effective in the management of the open abdomen (Fig. 5, Ref. 4). Full Text in free PDF [www.bmj.sk](http://www.bmj.sk).

Key words: SMAC, VAC, open abdomen.

An open abdomen carries a high mortality rate and represents a big surgical challenge (1, 2). Indications for the open abdomen are well known, and among others the most common are tertiary peritonitis, damage control surgery and abdominal compartment syndrome (ACS). These patients have to survive the septic phase together with concomitant organ dysfunction, that could result from the primary cause of ACS (acute pancreatitis, sepsis, trauma) or could be a complication of ACS (acute renal insufficiency). In the management of the open abdomen, many techniques were introduced. Among them, vacuum assisted closure (VAC) (3) seems as the most advanced technique with the best results concerning morbidity and mortality.

The recent introduction of VAC explains the speed of new techniques including STAR – Staged Abdominal Repair, Fabian Protocol, VAC supported with PDS, support with polyglactin mesh and use of tissue expanders in staged closure of open abdomen. One of the methods, SMAC (Sandwich Mesh Abdominal Closure), emerged in April 2008 on VAC Drei Lander Congress in Linz and was introduced by authors from Günzburg and Munich (4). We improved this technique and used it on the first patient.

**Technique**

SMAC incorporates principles of staged repair of STAR with support of the abdominal wall with polypropylene mesh (Figs 1 and 2). This approach not only inhibits fascial retraction (a com-



Fig. 1. Open abdomen with non-adherent layer on the viscera.



Fig. 2. Support of the abdominal wall with polypropylene mesh sutured to fascia over non-adherent layer.

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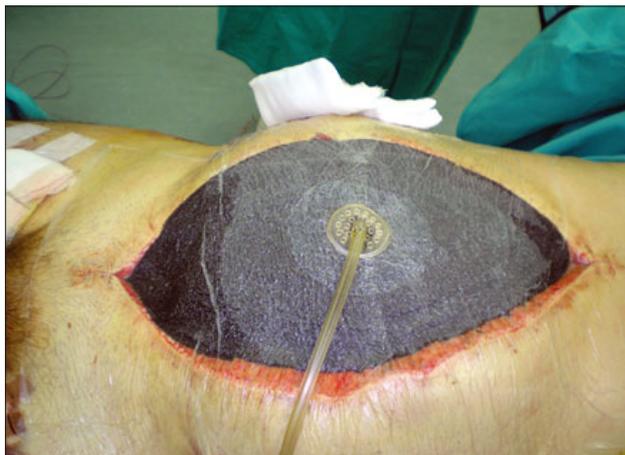


Fig. 3. Usual abdominal dressing.

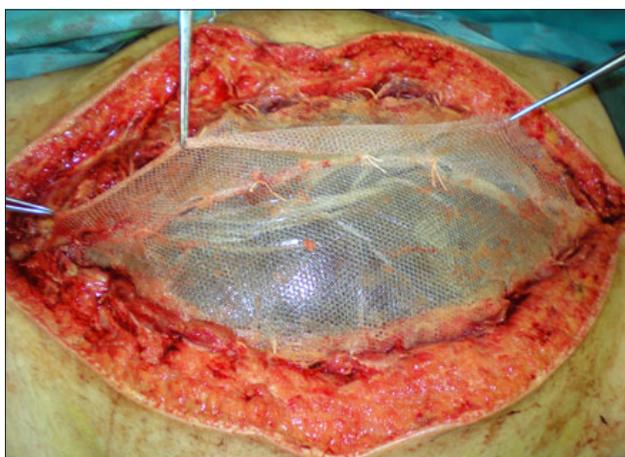


Fig. 4. Secondary operation with incision and reapproximation of graft.

mon problem in delayed abdominal closure), but it also relieves patient from secondary operation for ventral hernia, which is a common complication in patients with open abdomen, and inevitable in patients, where open abdomen was closed by overgranulation of visceral mass covered with split skin graft. This herniation is caused by maturation of collagen in the scar and occurs approximately one year after grafting.

In SMAC management, after careful cleansing of the viscera and application of protective membrane on the viscera, we suture the edges of fascia to a polypropylene net, which is then covered in a usual way by granufoam and drape (Fig. 3). During subsequent redresses, polypropylene net is cut longitudinally and the edges are drawn together and sutured 2–3 cm closer, than during last redress, thus actively closing the fascia (Fig. 4). Remaining polypropylene is cut off. When an absolute approximation is possible, existing polypropylene graft or a new one can be used to create a pseudo-Lichtenstein hernia repair.

Our improvement of the original SMAC technique lies in suturing polypropylene graft to fascia edges, with latter rein-



Fig. 5. Final closure of abdomen with polypropylene mesh reinforcement.

forcement. By doing this, we highly support fascia and prevent its retraction, while maintaining superb drainage and all advantages of VAC system.

#### Case report

We present a case of a 36 years old patient, who was admitted after polytrauma in car accident, with concussion, comminutive fracture of right iliac crest with dislocation of fractured pieces into iliac muscle and into retroperitoneal fat. On CT scan there were bilateral dystelectases in lung parenchyma and hemoperitoneum of app. 500 ml, which seemed to originate in iliac fracture. After 4 days, the patient started to deteriorate, went into septic shock, was found to be allergic to penicillin with anaphylaxis, progressed to renal insufficiency, MOF (multi organ failure), and pneumoperitoneum was observed on the second CT scan. During operation, necrosis of ileum was found, ileum was resected and the whole abdomen was packed with gauze. Second operation took place 12 hours after patient stabilization, when another part of ileum was resected, also appendectomy, ileostomy and coecostomy was performed. Due to abdominal compartment syndrome, the patient had to stay with an open abdomen. At this moment we decided, that we will manage the open abdomen using the SMAC protocol. The first repack was done on the third day, second on a seventh day, third on tenth day, fourth on fifteenth day, and the last one on nineteenth day, when fascia was closed and covered with new polypropylene mesh (Fig. 5). Patient recovered without major complications and was released to a lower hospital for next care.

#### Conclusion

SMAC VAC technique appears to be a very effective treatment option for patients with an open abdomen, with following big advantages: inhibition of fascial retraction and no need for operation for ventral hernia. We have an extensive experience in

the management of the open abdomen by different techniques, from non vacuum secundum Brock, to current standard, which is STAR VAC (Staged Abdominal Repair VAC). We can recommend the use of our modified SMAC method, because of its effectiveness and therapeutic potential. The only, and a very high drawback, is the cost of the therapy comprising of expensive material.

## References

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