

Recurrent incisional hernia, enterocutaneous fistula and loss of the substance of the abdominal wall: plastic with organic prosthesis, skin graft and VAC therapy.



Ann. Ital. Chir., 2015 86: 172-176
pii: S0003469X15022575

Clinical case

Sara Nicodemi*, Sergio Corelli*, Marco Sacchi**, Edoardo Ricciardi***, Annarita Costantino*, Pietro Di Legge**, Francesco Ceci*, Benedetta Cipriani*, Annunziata Martellucci*, Mario Santilli*, Silvia Orsini*, Antonella Tudisco*, Franco Stagnitti*

*Department of Urgency University Surgery (Director: Prof. F. Stagnitti), "A. Fiorini" Hospital, Terracina, Italy

**Department of General Surgery (Director: Prof. M. Sacchi), "S. Maria Goretti" Hospital, Latina, Italy

***Department of General, Oncologic and Transplantation Surgery (Chief: Prof. A. Gaspari), Tor Vergata University of Rome, Rome, Italy

Recurrent incisional hernia, enterocutaneous fistula and loss of substances of the abdominale plastic with organic prosthesis skin graft and VAC therapy. Clinical case

Surgical wounds dehiscence is a serious post-operative complication, with an incidence between 0.4% and 3.5%. Mortality is more than 45%. Complex wounds treatment may require a multidisciplinary management. VAC Therapy could be an alternative treatment regarding complex wound. VAC therapy has been recently introduced on skin's graft tissue management reducing skin graft rejection. The use of biological prosthesis has been tested in a contaminated field, better than synthetic meshes, which often need to be removed. The Permacol is more resistant to degradation by proteases due to its cross-links. Surgery is still considered the best treatment for digestive fistula.

A 58 years old obese woman come to our attention, she was operated for an abdominal hernia. She had a post-operative entero - cutaneous fistula. She was submitted to bowel resection, the anastomosis has been tailored and the hernia of the abdominal wall has been repaired with biological mesh for managing such condition. She had a wound dehiscence with loss of substance and the exposure of the biological prosthesis, nearly 20 cm diameter. She was treated first with antibiotic therapy and simple medications. In addition, antibiotic therapy was necessary late associated to 7 months with advanced medications allowed a small reduction's defect. Because of its, treatment went on for two more months using VAC therapy. Antibiotic's therapy was finally suspended. The VAC therapy allowed the reduction of the gap, between skin and subcutaneous tissue, and the defect's size preparing a suitable ground for the skin graft. The graft, managed with the vac therapy, was necessary to complete the healing process.

KEY WORDS: Biological prosthesis, Enterocutaneous fistula, Incisional hernia, Skin graft, VAC therapy

Introduction

Surgical wounds dehiscence is a serious post-operative complication, with and incidence tax set between 0.4% and 3.5%. Mortality tax is more than 45% ^{1,2}.

Surgical wounds healing, mixed with external and internal factor, is a complicated interaction between immune system and reticulo - endothelial system ^{1,2}.

Most significant risk factors like: age, male gender, chronic pulmonary diseases, anemia, jaundice, metabolic disease, radiotherapy or chemotherapy, steroids use, emergency surgery, type of surgery and wound infection could be responsible of surgical wound dehiscence ². Complex wounds treatment needs a multidisciplinary team approaching to be rightly solved ². Instead of hyperbaric therapy, VAC Therapy was recently recommended to

Pervenuto in Redazione Settembre 2014. Accettato per la pubblicazione Novembre 2014

Correspondence to: Franco Stagnitti (e-mail: franco.stagnitti@uniroma1.it)

be an alternative treatment regarding complex wound with loss of substances; furthermore it fastly reduces surgical wounds size, instead of conventional treatments³⁻⁵.

Clinical studies and laboratories researches show that VAC therapy increases blood's flow and a new granulation tissue, in addition it reduces bacteria and fluids increasing.

VAC therapy has been recently introduced on skin's graft tissue management reducing skin graft rejection^{3,6}.

The use of skin's graft greatly reduces the management for complex wound³. Biological prostheses reduce complication's incidence of abdominal wall in contaminated surgical fields^{7,8}. The medical engineering realized biological prostheses stronger and more secure than non biological ones⁷.

Case Report

In February 2011 a 58 years old obese patient, came to our observation. She had a history of central right pulmonary lobectomy in 2000. In 2003, she underwent to VLS cholecystectomy for lithiasis and endoscopic sphincterotomy for Papillo Oddite. In 2007 she was treated in the surgical department because a periumbilical clogged incisional hernia with ischemic loop occurred. A plastic muscle - aponeurotic with bowel's resection and ileal anastomosis and left oophorectomy for ovarian cyst were performed.

In June 2010 she was admitted to the hospital for abdominal colic and adhesions syndrome. She was discharged after a negative Recto-Sigma-Colon-Scopy (RSCS) with only a medical therapy. After this in 2010 she was hospitalized in medicine's department for myocardial ischemia and she was subjected to diagnostic tests like the coronary angiography which showed normal coronary arteries and a left bundle branch block. Moreover the consulting surgeon diagnosed an incisional complex umbilical hernia with a committed but reducible loop. The patient moved to the prehospitalize's care to be late subjected to the appropriate surgery. In February 2011, she was therefore subjected to Viscerolysis and Plastic of the incisional hernia employing a mesh of polypropylene. During this charge in fourth post-operative day (p.o.d) as post-surgical complication, below the muscle's layer, an entero - cutaneous fistula with abscess in the median anterior abdominal wall was diagnosed.

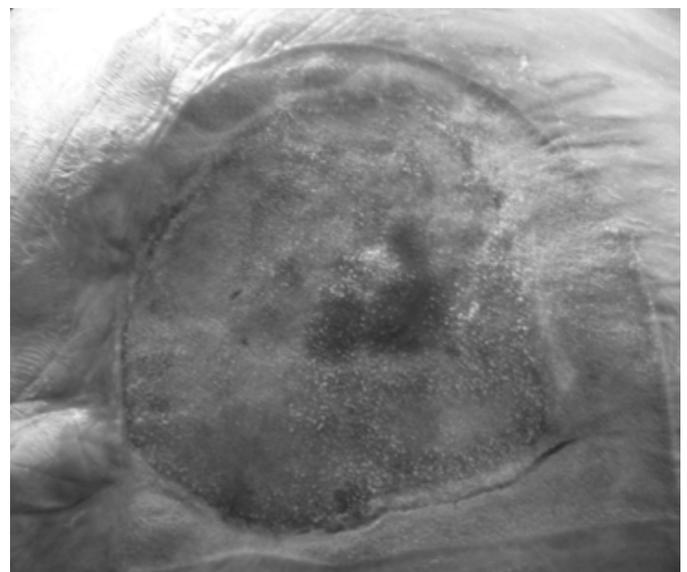
In XXIV p.o.d she was discharged with a secondary diagnosis of arterial hypertension and chronic bronchitis. She moved out to hospital's care with prescription of surgical ambulatory controls with a perspective of a wait and see attitude towards the above-mentioned complication. After the failure of non-operative management the patient was readmitted in April 2011 in order to apply new surgery's treatment. During hospitalization complete thrombosis at the confluence between the deep and

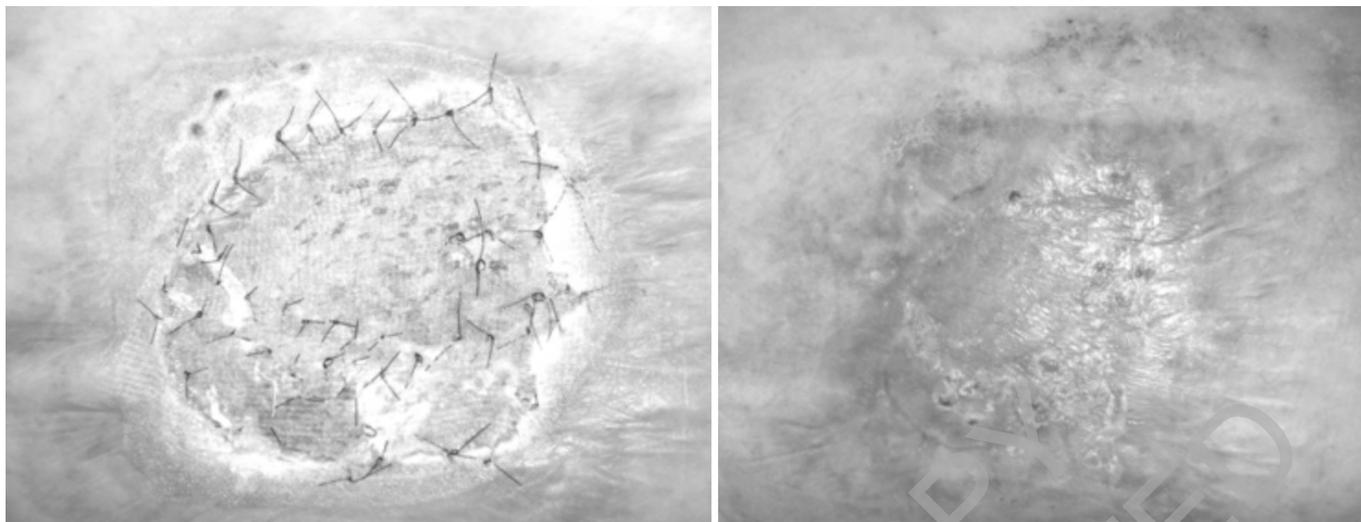
superficial right femoral vein was diagnosed and lack of filling of the segmental branches to the lower lung lobes attributable to pulmonary embolism in place has been showed.

Therefore it was placed a permanent vena cava filter (Braun Venatech LP). IN XLV p.o.d. the patient underwent to a new surgery, in order to remove haernia's implant, moreover she has been treated with a bowel resection and a new anastomosis was tailored, finally a plastic wall with biological prosthesis of porcine collagen was made. The prosthesis implanted was Permacol, a permanent implant cross-linked.

In the immediate post-surgical period a wound infection appeared. An antibiogram performed in XI p.o.d. showed an infection of the surgical wound by the *Enterobacter cloacae*. In the XIV p.o.d she was discharged only with medical therapy.

Few days since the discharge, the patient presented dehiscence of the surgical wound with a large loss of substance, for a diameter that was nearly to be at 12 cm. Again the patient was subjected to antimicrobial susceptibility test that showed an infection with *Pseudomonas Aeruginosa* and *Staphylococcus Aureus* multidrugs resistant. Medical therapy was set after consultation with infectious diseases specialists. Subsequent antibiograms were negative for the presence of pathogens. The antibiotic-therapy administered four months, and the presence of biological prosthesis prevented systemic spread of infection. Specific antibiotic therapy was associated with advanced medications for three months allowed a small reduction in the size of the defect. The treatment continued with the use of VAC therapy in continuous pressure for approximately seventy days without antibiotic therapy. The VAC Therapy allowed the reduction of the gap between skin and subcutaneous tissue and the size of the defect preparing a suitable plot of land to a skin graft.





In January 2012 was placed an auto-graft withdrawn from the thigh through dermatome in local anesthesia. During first five days the graft was treated with VAC therapy and by inserting a silicone's gauze known as Adaptic (®Systagenix wound management) between the VAC sponge and the tissue. Subsequent dressings continued applying gauze of Connettivina. After fifteen days from placement of the graft, it was showed the complete healing of the parietal defect, with good aesthetic result.

Discussion

Some prostheses have been associated with specific complications⁷. The ideal prosthesis should constitute a biological matrix for the growth of the host tissue, it should be inert and non-carcinogenic, and it should not induce a foreign body response or an inflammatory response of considerable magnitude, finally it should be mechanically resistant to tension. The ideal device should not cause adhesions and it should incorporate the tissue without contraction or encapsulation^{7,8}. The complex reconstruction of the abdominal wall may be associated with an high rate of complications such as foreign body reaction, intestinal fistula formation, erosion of adjacent abdominal viscera, small bowel obstruction and mesh shrinkage or migration. The placement of a synthetic permanent mesh in a contaminated field is often associated with a high rate of wound's infection and subsequent the mesh needs to be removed^{7,9}. Biological graft induces a milder inflammatory response and lesser formation of adhesions. It has fewer propensities to infection, erosion, extrusion or rejection. So there is no intra-abdominal adhesion formation and fistula formation⁹.

Permacol is incorporated by growing tissue and support the neovascularization. It is a safe and acceptable alternative to the mesh repairing abdominal complicated wall defects^{7,8}. The biological implants, made of collagen's sheets, act as a scaffold for tissue regeneration with the orderly migration of cells and vessels able to proliferate, and to reconstruct tissue them self.

The Crosslinks procedure stabilizes protein's structure conferring mechanical strength and longer life^{7,8}. The chemical reaction that produces the link is the crosslinking and it's a natural process. There are therefore natural cross-links. In addition, the cross linking, can be artificially induced by various substances. It starts with extraction processes that remove cells, lipid membranes and antigens weaken the structure of collagen^{7,8}.

The crosslinks stabilizes the structure, it retards degradation of collagen by blocking the binding sites of collagenases and makes the xenogenic antigens present on the support of animal origin inaccessible to the immune system^{7,8}. The rate of degradation and the resorption is synchronized with the regeneration of autologous tissue⁷.

Surgery is the main treatment of digestive fistula that can occur after viscerolisis but its role has changed over the last 40 years¹¹.

Indication to surgical treatment, the timing and the choice of operation type often cannot be standardized because they depend on digestive fistula and on patient's characteristics¹¹.

The management of digestive fistula is both time consuming and emotionally taxing and need daily attention. Only specific experience in this field can lead to healing^{11,10}.

So, the decision of make conservative treatment of digestive fistulas depends on patient's conditions and surgeon experience¹⁰.



The VAC system that we used is composed of a sponge, a drain and a reservoir of 300 ml. It's a portable system. It has up to 14 hours of autonomy. The presence of hydrophobic filters reduces odor and eliminates the losses. It's also equipped with gel pads that solidify the exudate. The system is assembled with adhesive films of various sizes depending on diameter of the wound. The application of sub - atmospheric or negative pressure promotes the healing of ulcers in a wide range of clinical settings, and it's a system of advanced therapy able to optimize patient care, promote rapid healing of the wound and helps to manage costs. It can be used in many cases in hospitals than in community ^{4,5}. This device, if used properly, produces excellent reconstructions for deep wounds of skin and soft tissue defects without surgery with flaps extended ³⁻⁵. VAC Therapy is recently uses in the treatment of skin grafts, preventing tissue rejection, favoring engraftment and reducing the healing time ^{3,6}.

Conclusions

In our small experience, the use of biological prosthesis and antibiotic therapy prevented the onset of severe complications related to systemic spread of infection.

Conservative treatment may be an option for digestive fistula but surgery remains the most widely used treatment.

In our case, the surgery was been the best solution for the healing of the fistula.

Permacol is more resistant to degradation by proteases due to its cross-links. The presence of this prosthesis prevented abdominal complete evisceration, but it doesn't prevent the superficial tissue's necrosis. The presence and the persistence of ulcer in our examination presupposed an intense activity of proteases. This consideration led us to choose the VAC therapy as a target treatment for the reduction of protease's activity.

Currently there are available tests to define specific proteases, unfortunately they were not yet in use at the time of our case report. Antibiotic therapy is useful preventing the onset of severe complications related to systemic spread of infection. The use of VAC therapy has significantly reduced the healing time of dehiscence assisting the cleansing of the wound bed and stimulating the formation of granulation tissue. The skin graft was necessary in order to complete the healing process and permanently repair the defect.

Riassunto

La deiscenza della ferita chirurgica è una complicanza post-operatoria severa, con un'incidenza descritta in letteratura tra 0.4% e 3.5%. Il tasso di mortalità riportato è superiore al 45% ^{1,2}.

Il trattamento delle ferite complesse può richiedere una gestione multidisciplinare ^{1,2}.

È ormai consolidato l'uso della VAC Therapy nella gestione delle ferite complesse e recente è l'uso nella gestione degli innesti tissutali, riducendo il tasso di rigetto ^{3,6}. È stato più volte testato l'uso delle protesi biologiche in campo contaminato. In campo infetto, queste protesi, risultano migliori delle protesi sintetiche, che spesso richiedono la loro rimozione. Il Permacol è reso più resistente alla degradazione dai suoi crosslinks ^{7,8}.

La chirurgia è ancora considerata miglior trattamento chirurgico per le fistole digestive.

Una paziente di 58 anni, obesa, veniva sottoposta ad intervento di plastica di laparocoele.

Nel post-operatorio veniva diagnosticata una fistola entero - cutanea. La paziente veniva sottoposta ad intervento chirurgico di resezione intestinale con anastomosi e plastica della parete con protesi biologica. Nell'immediato post-chirurgico la paziente presentava deiscenza della ferita chirurgica con ampia perdita di sostanza, di circa 20 cm di diametro, ed esposizione della protesi.

L'antibiotico-terapia e la presenza della protesi biologica impedivano la diffusione sistemica dell'infezione.

La terapia antibiotica mirata associata alle medicazioni avanzate per circa 7 mesi consentivano una piccola riduzione delle dimensioni del difetto.

Il trattamento proseguiva con l'utilizzo della VAC therapy per circa 2 mesi, ottenendo la riduzione del gap tra cute e sottocute, la riduzione delle dimensioni del difetto e preparando così un terreno idoneo per un innesto cutaneo.

Il trattamento veniva completato con un innesto cutaneo, riparando definitivamente il difetto.

References

1. Ramshorst Gabriele H Van, Nieuwenhuizen J, Hop Wim CJ, Arends P, Boom J, Lange JJ: *Abdominal wound dehiscence in adults: Development and validation of a risk model*. World J Surg, 2010; 34:20-27.
2. Spiliotis J, Siveriotis K, Datsis AD, Vaxevanidou A, Zacharis G, Konstantinos Giasis K, Kekelos SJ, Rogdakis A: *Wound dehiscence: Is still a problem in the 21th century: A retrospective study*. World Journal of Emergency Surgery, 2009, 4:12.
3. Webster J, Scuffham P, Sherriff KL, Stankiewicz M, Chaboyer WP: *Negative pressure wound therapy for skin grafts and surgical wounds healing by primary intention*. Rev, 2012; 4-18.
4. Fadhli Ahmad A, Alexander G, Kanjoor Roy J: *Versatile use of vacuum-assisted healing in fifty patients*. Indian J Plast Surg, 2009; 7-12; 42(2):161-68.
5. Lee DL, Ryu AY, Rhee SC: *Negative pressure wound therapy: An adjuvant to surgical reconstruction of large or difficult skin and soft tissue defects*. Int Wound J, 2011; 8(4):406-11.
6. Senchenkov A, Petty PM, Knoetgen J, Moran SL, Johnson Craig H, Clay RP: *Outcomes of skin graft reconstructions with the use of Vacuum Assisted Closure (VAC®) dressing for irradiated extremity sarcoma defects*. World Journal of Surgical Oncology, 2007; 5:138.
7. A Report By Tissue Science. Permacol®: *Creating a Better Biologic for Hernia Repair*. US Gastroenterology review, 2006.
8. Parker DM, Armstrong PJ, Frizzi JD, North JH jr: *Porcine dermal collagen (Permacol) for abdominal wall reconstruction*. Curr Surg, 2006; 63(4):255-58.
9. Galli D, Goi G, Paliani Dmoroni E, Danelli PG: *The use of biological mesh to repair one large, contaminated abdominal wall defect due to neoplastic invasion. Report of a case*. Ann Ital Chir, 2013; 83: 167-69.
10. Castriconi M, Romagnuolo G, Giuliano Maria E, Bartone G, Chianese F, Maglio Mauro ND, Molino C, Festa P, Zito ES, De Sena G: *Trattamento conservativo delle fistole digestive: Nostra esperienza*. Ann Ital Chir, 2005; 76:523-27.
11. Cozzaglio L, Farinella E, Coladonato M, Sciannameo F, Gennari L, Doci R: *Current role of surgery in the treatment of digestive fistula*. Ann Ital Chir, 2010; 81:285-94.