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Use of Omental Flap in the Management of Postoperative Mediastinitis

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Abstract:

Introduction: Post sternotomy infections are a dreadful havoc of modern cardiac surgery.General complications of wound healing include hypertrophic and keloid scars, sterna wires sinus and failure of healing in the form of mediastinal dehiscence and infections.

Methodology: This study was conducted in National Heart Institute, Imbaba, and Cairo Egypt in the period between January 2006 to January 2009. During that period, we faced repeated problems of sternal wound infection after open heart surgery, some of them were serious and the majority were resolving and self limiting.

We used Omental flap in 7 patients with life-threatening Mediastinitis, 4 of them were females and three were males of age range 54-68 years. All of the patients were diabetics type II and all females had body mass index more than 35. One of the male patients was of body mass index 33 and the other was 30.The primary operation was CABG in all patients and we used LIMA in all of them. We didn't use bilateral mammary in any patient.

Results: In this study two patients died, one male patient died 48 hours after the flap procedure and the other was a female patient who died after two weeks from the procedure. The rest of the patients were in good health and were discharged and being followed up now for a period of 18 months.

Conclusions: Omental flap is a useful relatively easy procedure that can be invaluable in the treatment of advanced mediastinitis following open heart procedures utilizing median sternotomy.

Key Words: Mediastinitis, Omental flap

Introduction:

Post sternotomy infections are a dreadful havoc of modern cardiac surgery.General complications of wound healing include hypertrophic and keloid scars, sterna wires sinus ⁽¹⁾, and failure of healing in the form of mediastinal dehiscence and infections ⁽²⁾. The incidence of dehiscence and infections are estimated in recent research to be around 1.9% ⁽²⁾. Some cases require repeated debridement and major surgical reconstruction. There is considerable increase in the length of hospital stay, and the incidence of further complications is high ⁽³⁾.

Morphology:

Mediastinal dehiscence: wound defect in the absence of clinical or microbiological evidence of infection.

- **Mediastinal wound infection:** clinical or microbiological evidence, of infected presternal tissue, and sternal osteomyelitis, with or without mediastinal sepsis and with or without unstable sternum .(4)

Diagnosis is usually based on:

Local signs: Signs of chest wall instability, erythema, fluid collection, wound dehiscence and

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purulent discharge (5). Wound discharge is the most common presentation and occurs in 70- 90% of cases. Purulent drainage is an obvious sign of infection. Sternal instability or a palpable "rocking" sternum on coughing often in association with increased pain frequently appeared within 12 days (6). Mediastinitis should be considered in cases of slow postoperative recovery. Daily clinical evaluation of patients in the immediate postoperative period and high index of suspicion are the most important factors in ensuring early diagnosis (7).Figure (A) shows the gravity of the infection:

Systemic signs: Fever and leucocytosis support the diagnosis of chest wall infections (5). In the absence of local symptoms or signs fever and leucocytosis may be the presenting clinical features in a small percentage of patients. The highly persistent fever was the most alarming sign for mediastinitis (6).

Late presentation of 10 to 30 days: The commonest timing at presentation is approximately 10 to 30 days. The patient usually has been discharged from the hospital but returns complaining of pain, an increase in purulent drainage, and lethargy because of the inability to sleep secondary to pain while lying on their side. The patient may present with signs of sepsis requiring blood pressure support and assisted ventilation but this is unusual. CT scan is of value in diagnosis. (8).



Figure (A): One of the patients in the series, before intervention.

Managment:

Prophylactic measures: to decrease infection, the number of bacteria (as measured by CFU/m²) is to be acceptable as the standard in open heart. This is influenced by the ventilation system in the operating room .The staff should wear tightly woven clean air suits instead of cotton suits (9) .Preoperative showering with chlorhexidine is commonly practiced. Elimination of nasal carriage reduces the incidence of wound infections (10).

Surgical technique: Avoiding sternal necrosis and ischemia especially the use of bilateral internal mammary artery which is associated with an increased risk of deep sternal infection (11). Discriminate use of electrocautery on presternal tissue has been shown to decrease the incidence

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of wound infection in dogs, and systematic use of the technique has been reported to be associated with a low incidence of mediastinitis in humans (12). Avoidance of hematoma, bleeding and dead space. (13). Avoidance of permanent or long-term implantation of IV catheters and suture material should be advocated. Using rigid fixation of sternum in the form of orthopedic plating is suggested by Friberg (14). However, cardiothoracic surgeons have been reluctant to adopt rigid plate fixation because of the difficulty of reentry to the chest cavity in emergency situations and redo procedures.

Antibiotic prophylaxis: With the expansion of coronary bypass surgery 25-30 years ago the aim seems to have changed mainly to prevention of sternal wound infections (15). Use of prophylaxis of less than 48 hours' duration is now generally accepted (16). In fact, a duration of more than 24 hours has been recommended and to extend the prophylaxis until all catheters and drainage tubes are removed cannot be considered appropriate.

Patients and Methods:

This study was conducted in National Heart Institute, Imbaba, Cairo Egypt in the period between January 2006 to January 2009. During that period, we faced repeated problem of sternal wound infection after open heart surgery, some of them were serious and the majority were resolving and self limiting.

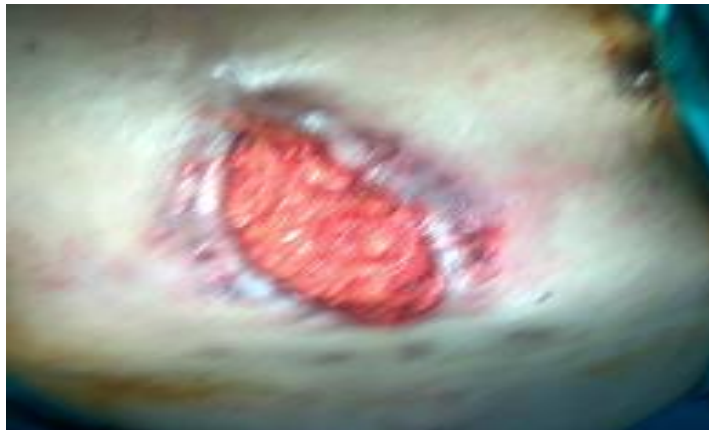
We used Omental flap in 7 patients with life-threatening Mediastinitis, 4 of them were females and three were males of age range 54-68 years. All of the patients were diabetics type II and all females had body mass index more than 35. One of the male patients was of body mass index 33 and the other two were 30. The primary operation was CABG in all patients and we used LIMA in all of them. We didn't use bilateral mammary in any patient.

Technique: The Omental flap procedure was done under general anesthesia and invasive monitoring. We had a surgeon starting from above to debride the wound and another one from below to process the flap. Omentum was separated from the transverse colon far up to the splenic flexure to have good length and to avoid distortion to the stomach during lifting up of the flap. We used an anterior slit in the central tendon of the diaphragm to pass the omentum to the chest and then we fix the flap above the wound with interrupted suture and then we affected skin closure by interrupted tension suture like technique. Redivac drains were used in all patients and were removed between 10 days and two weeks.

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Figure (B): Processing of the Flap.



Figure(C): The flap covering the sternum.

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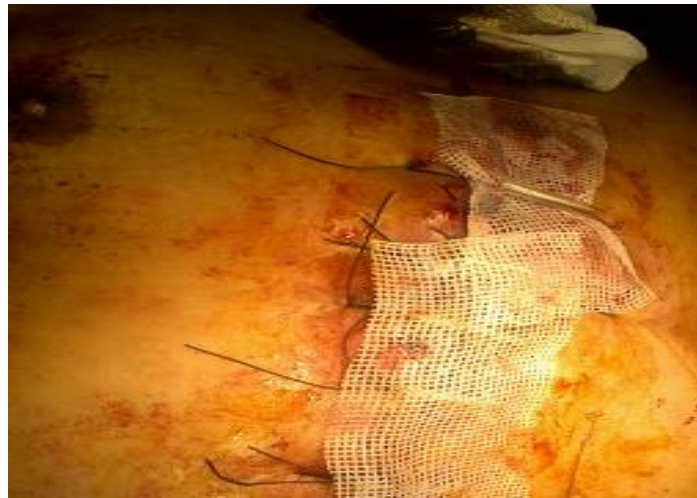


Figure (D): Wound covered by Skin Flaps.

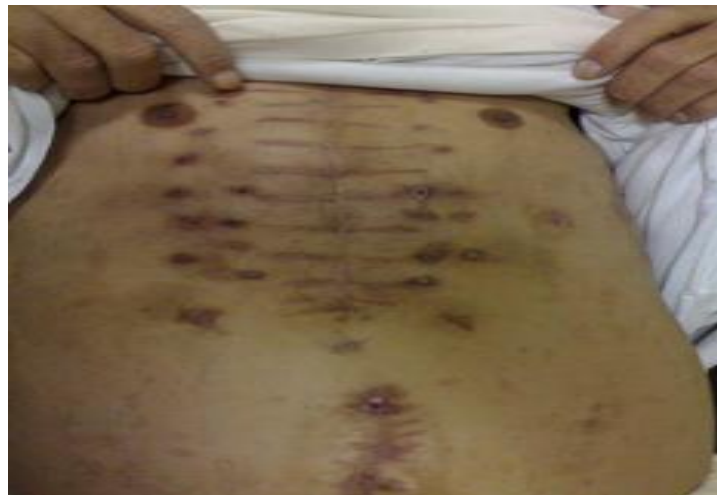


Figure (E): One of the Patients after 6 months of intervention.

Results:

Two patients died post operatively. One male patient and one female patient. . The male patient died 48 hrs after the procedure. He was in advanced sepsis and was oliguric and had a massive attack of hematemesis. The other patient was a female of BMI more than 35 who had dehiscd

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wound and skin flap necrosis after the procedure. A breast rotation flap was done to her by a plastic surgeon after 10 days from the omental flap procedure but in spite of that she had advanced sepsis and was ventilator dependant and died after two weeks from the procedure. The rest of the patients were in good health and were discharged and being followed up now for a period of 18 months.

Discussion:

Krabatsch et al, ⁽¹⁷⁾ reported 40 patients who underwent omental transfer for DSWI after CABG, with an in-hospital mortality rate of 19%. Yasuura et al ⁽¹⁸⁾ reported 84% survival in a group of 44 patients with DSWI treated by isolated omental transfer. Several advantages have been reported regarding omental transfer versus a muscle flap. For instance, the omentum contains high numbers of immunologically active cells, and abundant vascularisation coupled with neovascularisation potential increases the blood supply in the infected area, leading to increased oxygen, nutrition, and delivery of antibiotics. Furthermore, the amorphous shape of the omentum and its capacity to absorb wound secretions allows more secure filling of dead space, preventing bacterial growth ⁽¹⁹⁾. Although some early and late complications can be caused by abdominal contamination, the incidence of these complications is quite low.

We had a mortality rate of 28.56% as compared to other researchers ⁽¹⁷⁾ and that may be attributed to the fact that, the decision of intervention in both patients was late. The sample size is small and the follow up period was relatively short to assess for long term complications of the procedure.

It is worth noting that, there is now a new consensus towards the use of high vacuum suction as the first step in the management of such complex infections.

Using high pressure negative suction drain in the anterior mediastinum and re-wiring is a simple and effective way of treating mediastinitis ⁽²⁰⁾

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