RESEARCH PAPER

Breast Cerclage: An Innovative Expedient for Perimammary Dehiscence Healing

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Abstract The perimammary zone is a critical area for healing, due to high incidence of dehiscences, especially sternal ones. Although deep sternal wound complications are nowadays less common after cardiac surgery, in some at risk patients, dehiscences still represent important complications of major cardiac or vascular surgeries and they are directly correlated to an increased risk of patient's morbidity and mortality. A heavy breast represents a source of tension on the perimammary wound, inhibiting or delaying a complete recovery.

We report the case of a 66-year-old female patient with a critical post-surgical sternal dehiscence and multiple chronic comorbidities. The dehiscence was managed with a routinely performed primary intention closure combined with an innovative breast cerclage. To our opinion, this is the first reported description of a breast cerclage used as an expedient to reduce tension on the wound and minimize the risk of relapse, allowing a rapid and complete healing. This novel technique has proved to be effective and satisfactory in the achievement of both a functional and aesthetic results and we are confident that it could become a fully-fledged wound healing issue in chest wall reconstruction.

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Introduction

Median sternotomy, popularized in the early sixties by Julian and co-workers,¹ has become nowadays one of the

most commonly performed procedures in cardio-thoracic surgery, providing a wide view and access to the thoracic cavity.

The sternal dehiscence, often accompanied by mediastinitis (infection of the deep soft tissues), is the most serious complication following this type of incision.² The incidence of dehiscence is directly correlated to the patient's morbidity and mortality; as a matter of fact, current literature reflects that 0.2–10% of median sternotomy incisions are complicated by wound infections, leading to sternal dehiscence. Mortality runs between 5% and 20% when infection is present.³

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The management of chest wall reconstruction from sternal dehiscence has evolved consistently over the past half century and plastic surgery played a crucial role in addressing wound healing issues.⁴

Healing of this surgical complication can be affected and retarded by multiple factors; in this case we describe a new surgical procedure used to solve one of these complicating factors, the tension, permitting a complete repair in the perimammary zone, a critical anatomical region for healing.

Material and methods

Design and participants

The case involves a 66 years old woman, referred to us from the colleague cardiac surgeon, with an extensive dehiscence of a median sternotomy, resulting from a mitral valve surgery (Fig. 1A) performed three months before. Her postoperative course was significant for mediastinal wound infection and represented a type II according to the Pairolero classification⁵ and a type II according to the recently published Monteiro et al. Classification.⁶ The infection was treated with antibiotic therapy (initially a broad-spectrum therapy, to which daptomycin and carbapenems were added) and two unsuccessful debridement interventions, few weeks apart one from the

other. After the second debridement, vacuum assisted therapy (V.A.C. Ulta™) was used, unsuccessfully, for about two months, until the final surgical procedure we are going to describe afterwards was performed.

Her anamnesis documented a left upper lobectomy for lung adenocarcinoma, followed by an intensive adjuvant RT cycle for one month and no chemotherapy. Of note, the patient had a 30 pack-year smoking history.

Moreover, the physical examination revealed a remarkable thoracolumbar scoliotic deformity and a significantly enlarged left breast, further burdened by a marked lymphedematous stiffness; the coexistence of these anatomical defects resulted in a laterally pulling mass stretching the homolateral sternal wound margin and making its healing impossible (Fig. 1B).

The patient therefore underwent surgical expedient we are going to describe.

Procedure

She was under general anaesthesia. Primary intention wound healing was chosen, consistently with the remarkable comorbidities of the patient.

Bilaterally, the pectoralis major was dissected from the sternal insertion until the anterior axillary line, to gain complete lateromedial mobility of the muscle, but without the realization of a proper muscular flap. Then, the wound margins were approximated to reach a complete wound covering; the apposed tissue layers were stabilized with a 2/0 subcutaneous inert absorbable polyglactin (Vicryl™, Ethicon, Somerville, New Jersey) and with a subsequent intradermic cutaneous synthesis with a 3/0 inert absorbable monofilament poliglecaprone (Monocryl™, Ethicon, Somerville, New Jersey). Finally, to overcome the tensile strength given by the pulling mass described above and to gain a complete wound healing, we performed a subcutaneous cerclage of the left breast with a 0/0 inert absorbable looped monofilament polyglyconate (Maxon™, Covidien, Dublin, Ireland): the whole breast circumference was encircled over a regular subcutaneous plane with a long ½ circle needle passed in a purse-string method; the gently pulled up thread was finally fixed to the lateral margin of the sternum (Graphic 1). In this way the breast laid over a suspended plane and was moved closer to the homolateral dehiscence margin avoiding stretching of the wound and minimizing the risk of relapse.

Results

The results were satisfying (Fig. 2). After few weeks, the patient was discharged from the hospital and the tailored post-op antibiotic therapy given during the recovery was suspended.

Figure 1 Preoperative images of the sternal dehiscence. **A:** frontal view showing the enlarged left breast and the severe thoracolumbar scoliotic deformity. **B:** caudal view of the laterally pulling mammary mass.

Figure 2 Image shows the final postoperative result of median sternal suture. The wound is closed without tension or stress on the stitches.

On subsequent follow-up, about one month later, the sternal dehiscence completely healed and no sign of mediastinitis was documented (Fig. 3A, B). The patient did not present any other discomfort or complication.

Discussion

The one described is a particular case: we are dealing with a patient with a lot of comorbidities. The previous radiotherapy is believed to be the primary cause of the reported lymphedema and a significant contributory cause to the dehiscence.⁷ Furthermore, her smoking history is also a remarkable factor impairing proper wound healing.^{8,9}

According to our experience, sternal dehiscence reconstruction with muscle flaps is poorly advisable in a patient as the one we are presenting. To us, it would lengthen and complicate the surgical operation and the post-operative progress, as the risk of a new dehiscence and flap failure due to the breast traction is high; Furthermore, being the patient's ejection fraction low, the flap might be poorly vascularized.

For all these reasons, on the basis of the reconstructive ladder model, we decided to perform the simplest effective approach preserving more complex and sophisticated techniques for the future, in case of need; thus, we chose to combine the routinely performed primary intention wound healing with the innovative, beforehand described, breast cerclage technique; our goal was to re-distribute the traction force given by the mammary mass by suspending it and moving it closer to the median line.

The choice of the Maxon™ suture was not casual: in fact, being a looped suture, it provides double the strength of a normal single strand reducing closure time by 50% respect the common absorbable sutures,¹⁰ but also, being a monofilament construction, is poorly traumatic for the tissues. Eventually, being long-term absorbable, it ensures a long-lasting but not irreversible support; this concept is

Figure 3 A: frontal view; B: caudal view of the wound at 20th day follow-up. The median sternal dehiscence is completely healed, with no areas of necrosis.

fundamental for both functional (i.e. for optimal wound healing) and aesthetic purposes: the 3 weeks demonstrated in-vivo half-life tensile strength of the Maxon™ ensures an adequate timing for the wound closure¹¹ and an early return of the breast to its original position, being progressively reabsorbed (Maxon™ suture elicits a minimal acute inflammatory reaction in tissues, followed by gradual encapsulation of the suture by fibrous connective tissue with a final, complete, hydrolysis).¹²

Conclusions

This is the second time we used the breast cerclage as an expedient to allow a complete healing of a surgical wound dehiscence. In our first case, the patient had a submammary dehiscence, resulting from a wound of thoraco-phrenic-laparotomy origin. The wounds of the two patients were both complicated by “heavy” breasts and in both cases the result was optimal, with a complete dehiscence healing, absence of complications and satisfactory aesthetic final results.

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