Post-operative complications of custom-made 3D thorax implants: prevention and management

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PROTOCOL CONTENT

HAEMATOMAS

The risk of haematoma is common to all invasive surgical procedures.
In congenital thoracic malformations, it is more common with large perforating pedicles or muscle sections (pectus excavatum) than with atrophic perforating pedicles and no muscle sections (Poland syndrome, calves).
It can be triggered in the immediate postoperative period by the gradient of depression of a suction drain which can loosen the coagulation clot from a large perforator (2nd-3rd intercostal space), even if placed at a distance from it. The drain is between the two perfectly smooth planes of the rib cage and the implant.

Prevention

Meticulous step-by-step haemostasis during muscle removal and detachment; this requires very good lighting with a cold-light headlight or on an illuminated hook retractor (Storz 9 cm). The electric knife must be adjusted to ensure continuous coagulation over the entire cleared area. Short protected electrodes are used (to avoid burning the skin edges), followed by long electrodes (to reach the limits of the detachment). In the event of a persistent layer of bleeding after dissection, large abdominal compresses soaked in very hot saline can be introduced to activate clotting (transformation of fibrinogen into fibrin). Coagulation can then be completed with the electric knife in fulguration mode. Several checks are often necessary to obtain a bloodless dissection plane and to be able to insert the implant, which is taken out of its pouch sterile at the last moment.

Early treatment

Haematoma must be diagnosed early. It is obvious in the case of wall curvature, but it may be more discreet and hidden behind the implant. The warning sign is the persistence of blood staining after the first three punctures. It is best not to hesitate to do a quick revision at the slightest doubt after a control ultrasound. The patient is taken back under general anaesthesia, the space is opened, the implant is removed, the haematoma is evacuated, the clot removed, washed and haemostasis is completed. In the event of an uncontrollable layer of bleeding, use the time necessary to first apply abdominal compresses soaked in very hot saline and then complete with the electric knife if necessary in fulguration mode. When the field is bloodless, the implant is reintroduced into its space and the three-plane closure is secured with absorbable sutures without drainage.

Delayed treatment

Bleeding may occur after the patient has been discharged and has returned home in the following days, from a large perforator. Immediate revision in the face of obvious symptomatology with pain and abdominal curvature. A neglected haematoma would lead to fibrosis and then gradual retraction which would be difficult to release and treat surgically.

INFECTION

The risk of infection is common to any invasive surgical procedure but is compounded by the placement of a large foreign body in a prepared space. This risk is most often related to bacterial contamination through the scar near the implant in its caudal part.

Prevention

Deterrent antibiotic therapy at induction: a 2 g injection of cefazolin.
Immediate placement of the implant in its space after removal from the sterile pouch and a final check of the sufficient limits of the dissection and haemostasis.

Closing in 3 separate planes:

- suture of the muscle plane from top to bottom, with separate inverted stitches, using 0 absorbable suture (vicryl/polysorb), large needle. The knots are short and remain under the muscle. If there is no suturable muscle in the lower part, an inverted stitch loads the deep subcutaneous fascia
- suture of the subcutaneous plane in separate inverted stitches with 3/0 monocryl suture. The knot is short (no braid), avoiding the exit of the strands towards the outside.
- the dermal-epidermal edges are sutured perfectly with intradermal monocryl 3/0 suture or glue (Dermabond).

The aim is to close the three planes perfectly tightly, without any risk of the sutures coming out and without the slightest space that could be a way in for saprophytic or virulent germs present or brought during dressing changes.

Suction drainage to be avoided:
A drain is not recommended in the vicinity of any implant because of the risk of contamination. The latter can be caused by saprophytic germs present (especially in men in the hairy underarm areas ++) and which penetrate via the drain cutaneous orifice, irritated by movement and the fact it stays in place for some time.

Avoid changing dressings at home:
The standard dressing applied in the theatre is changed on the day of discharge, after possible serum puncture, by the surgeon in charge, with reinforced precautions (antisepsis, sterile gloves, small lap sponges). A hydrocellular dressing is put in place for eight days (type mepilex border EM): no change at home, consultation after 8 days with the surgeon in charge and puncture if necessary. Removal of the dressing after 15 days.

Seroma puncture:
Always performed by the surgeon in charge with aseptic precautions using a 19 Gauge trocar and 60 cc Luer-lock syringes. A clear serous fluid is reassuring, a cloudy fluid after the first three punctures will be subject to bacteriological sampling and antimicrobial susceptibility testing.

Early treatment

Serous effusion that is prolonged (beyond five punctures) and becomes cloudy should lead to a bacteriological sample and a blood test being taken.

In case of the presence of saprophytic germs (Cutibacterium acnes most often), absence of clinical (fever, pain) and biological (SR, CRP, leucocytes) signs of infection, revision in the theatre with antibiotic coverage can be decided and involves removal of the implant, abundant washing of the cavity and any pseudomembrane with saline solution, reinsertion of the implant and closure.

In case of infectious signs and the presence of a pathogenic germ (staphylococcus aureus) the implant must be removed. It can no longer be resterilised.

Repeat surgery is possible within a minimum of 6 months with a new implant and appropriate antibiotic coverage.

MIGRATION

The risk of post-operative migration of the implant is rare if the surgical protocol is closely followed. If the implant moves out of its initial position and its compartment, it may be visible under the skin in the lower areas not covered by the pectoralis major muscles.

Prevention

- strict adherence to the surgical protocol, especially in the upper abdominal region where the implant must be stabilised and its caudal apex covered by the fascia of the rectus abdominis muscles.
- if seroma occurs, punctures should be continued at the consultation each week until a decrease to less than 20 cc is achieved.
- light circular restraint with a chest belt and pad is maintained for one month 24 hours a day, 7 days a week.

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