

# Surgical Protocol

## POLAND SYNDROME

### 3D Custom-Made Implants technique



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# PROTOCOL CONTENTS

<b>FOREWORD</b>	3
<b>PRE-SURGERY</b>	4
Measurement and implant/prototype marking	4
Preparation of the patient	5
Pre-surgery drawing	5
<b>SURGERY</b>	6
Surgical approach and incision	6
Dissection	6
Insertion	6
Suture	7
<b>SPECIFIC CASES</b>	9
Insertion of breast implant after Poland syndrome treatment	9
Breast implant present before Poland syndrome treatment	10
Breast implant and breast plasty for tuberous disease after Poland Syndrome treatment	11
Poland Syndrome type 3 with deep chest deformity	11
<b>SURGICAL OUTCOMES</b>	12
<b>SILICONE ELASTOMER PROPERTIES</b>	13
<b>BIBLIOGRAPHY</b>	13
<b>VIDEOS</b>	14
Step by step surgery guide	14
Webinar - Poland Syndrome Treatment	14
<b>CONTACTS</b>	15

## FOREWORD

Poland Syndrome is mainly diagnosed by partial or total agenesis of the Pectoralis Major (P.M.), mostly right sided. It is a rare congenital deformity, the incidence is estimated at only one in 30.000 births per year worldwide.

Poland Syndrome may be associated with varying degrees of thoracic abnormalities and malformations of the upper limb (20%). But, whatever the clinical type, the functional impact is weak.

A filling surgery with a 3D custom-made implant is a first choice procedure, simple, unique and for the whole life time.

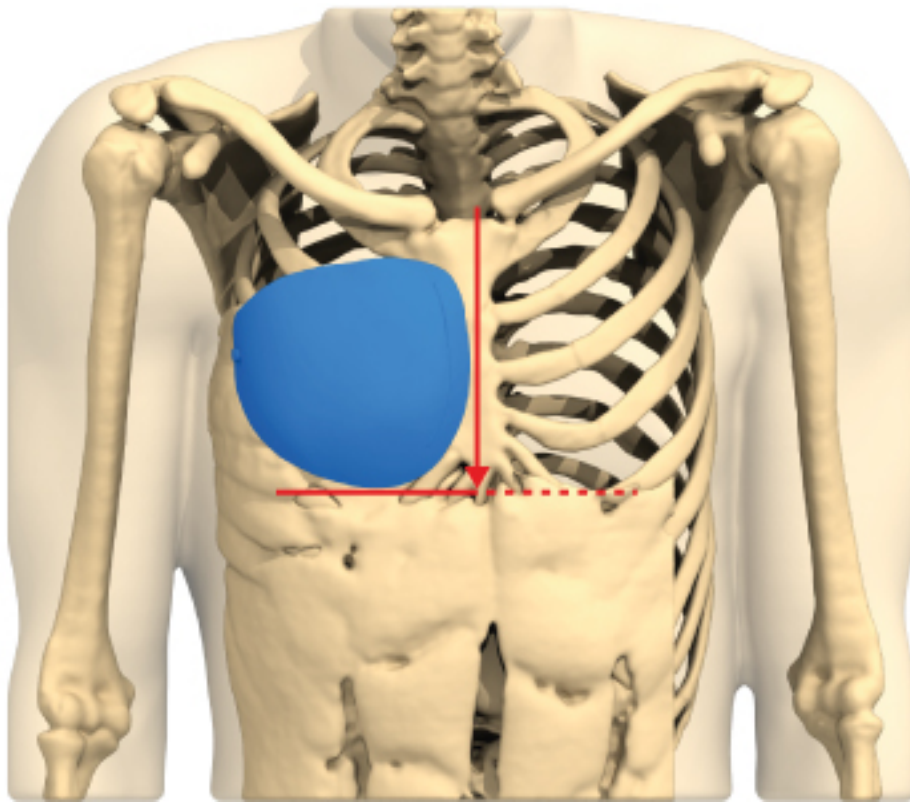
It can be associated in a second procedure with breast's implant in woman or lipofilling if needed.

It is adapted to male and female (sex-ratio 6/4) from 18 and until 60 years old.

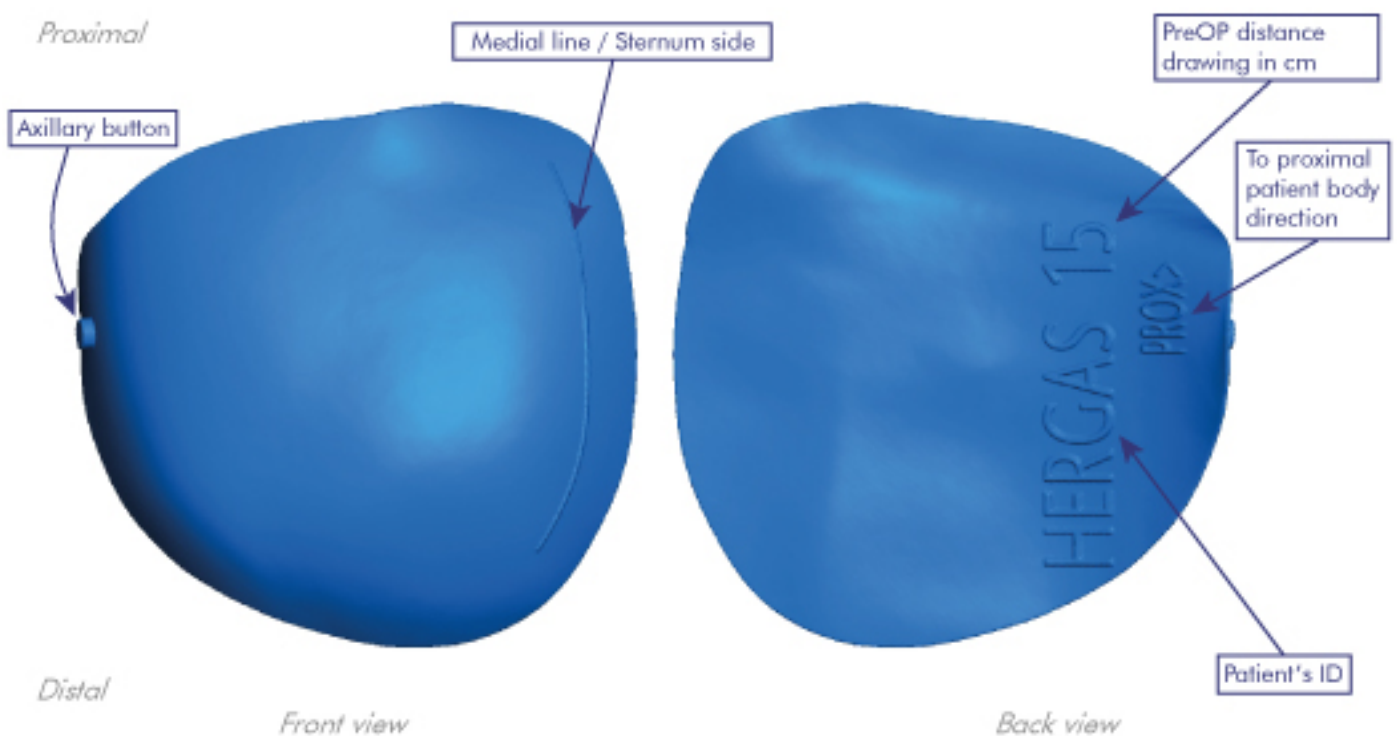
This very precise protocol is the result of an extensive experience of plastic, thoracic and pediatric surgeons, on hundreds of cases. Its objective is to avoid technical mistakes, to reduce the risk of complications, and to guarantee the best morphological results.

## PRE-SURGERY

### Measurement and implant/prototype marking



This measurement is the interclavicular to caudal implant subpectoral limit distance in cm taken on the virtual patient's chestwall. On the implant's and prototype's front face, a protruding line represents the medial implant's edge close to the sternum axis. On the lateral part, a button will be in the middle of the axillary approach. With these two indications, the prototype can be placed precisely in the correct position to trace around.



## Preparation of the patient

- Classic shower: brushing hands and feet. Nails must be unvarnished.
- Shave with trimmer, limited to the axillary and semi-chest area (dressing area).
- Dissuasive antibiotic infusion therapy with cefazoline 2G iv at the time of anesthesia induction, 30 minutes before the skin incision.

## Pre-surgery drawing

Patient in supine position, arms along the body.

The precise implant's area is drawn with a permanent felt pen, using the non-sterile prototype.

- Draw the pre-sternal midline from the supra sternal notch to the umbilicus.
- Mark the distance (engraved on the prototype) between the supra sternal notch and the sub pectoral line
- From this mark, draw the sub-pectoral horizontal line perpendicular to the previous one
- Prototype must be placed in the good direction « prox » upwards .
- The forward in relief line on the prototype is medial, close to the drawn sternal axis. The button is lateral axillary.
- Outline the position of the prototype inside the two lines.

Afterwards, arm is placed in abduction to mark the axillary approach.



## SURGERY

Antiseptic preparation, operating drapes, checkup, lighting control.

### Surgical approach and incision

- Axillary 8-cm incision of the skin with scalpel blade in a 'lazy - S' shape.
- Assistant holds the skin edges with two Gillies hooks.
- Incision of the subcutaneous plan in section mode is performed with the diathermy unit with protected short electrode (ideal: Stryker Colorado tips) to avoid skin edges burning.



### Dissection

- Progress in the ventral direction, push aside the anterior skin edge using Farabeuf retractors, respect the latissimus dorsi muscle (LD) backward, and the vasculo-nervous pedicle of the Serratus Anterior muscle (SA).
- Continue the forward progression up to the thoracic plane with Metzenbaum scissors while spreading the window with the two index fingers. The detachment between skin and smooth thoracic wall continues easily with the fingers and possibly by burying the whole hand. Proceed up to the limits drawn on the skin.
- In case of a too hard fibrous tract, dissection with the fingers is relayed by a section with long curved Mayo scissors.
- The dissection is not hemorrhagic, the para-sternal perforating vessels being atrophic unlike those in Pectus Excavatum cases.
- At the end of the dissection, the finger checks the limits of the implant compartment:
  - In cranial and medial, the detachment exceeds by 1cm approximately from the limits drawn on the skin to avoid folding of the very thin edges.
  - In caudal, the limits traced of the sub-pectoral fold are strictly respected.
- Installation of large gauzes soaked in hot saline (not lukewarm!): this accelerates primary coagulation (transformation of fibrinogen into fibrin).

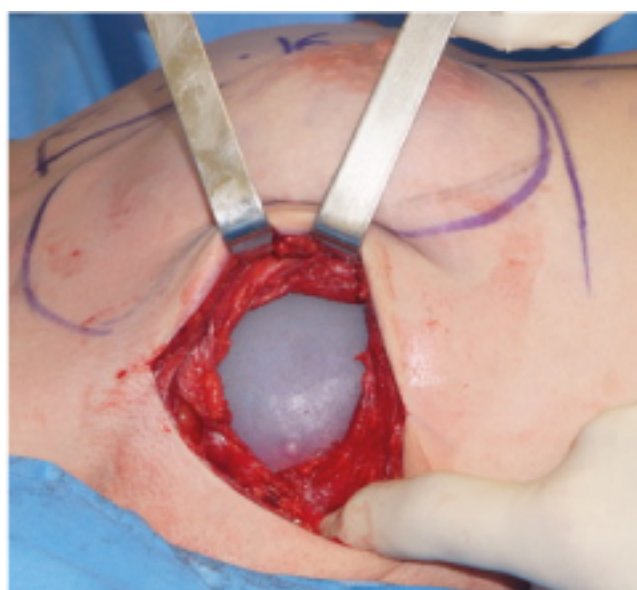
### Insertion

- The operators change their gloves. The instrumentalist cleans the skin with serum, dries it, sets up clean border drapes and orders the implant.

*The implant is sterile in a double envelope: only the first is half-opened and presented to the instrumentalist who grabs the second sterile pocket containing the implant (in the event of an accidental fall, the implant could still be recovered sterile!).*



- After changing gloves, the surgeon for one last time will check the whole cavity, its limits and of course completes the hemostasis if necessary.
- The surgeon will then ask the instrumentalist to open the pocket of the implant which he grabs, folds it on its transverse axis (button laterally, protruding line medially) and immediately introduces it into the cavity in the right direction (supported by Farabeuf retractors).
- The implant will spontaneously deploy and position itself within its cavity: the protruding line medially and the lateral «button» in the middle of the axillary approach.



## Suture

The closure can begin in the absence of bleeding:

- No deep fascial suture
- The subcutaneous plane is sutured with 3/0 monocryl with 5 inverted stitches in the absence of tension, 3 or 4 knots cut short are sufficient: the knots remains deep, the strands must not appear towards the surface.

*The use of absorbable braided Vicryl or Polysorb threads is not recommended for subcutaneous use, as they have a higher risk of picking up saprophytic germs from the skin, especially if the numerous knots lead to the formation of a rigid "braid" which risks becoming direct outwards - a real highway for saprophytic skin germs with rapid seeding of the entire suture line and then of the implant.*

- The dermal plane is sutured with 3/0 monocryl in continuous intradermal suture: the passages are in the deep dermis.
- The continuous intradermal suture must slide well: it will be locked up by a single small knot inserted by a longitudinal traction. The wire is cut 3cm from its outlet and held by a steri-strip.
- Suction drain not needed.
- The dressing is standard.

- The contention is ensured by a polyurethane band (Microfoam 10cm) in two (or three) oblique passages from the dorsal region to the sternal region: simple pose without stretching to avoid an epidermal tearing.

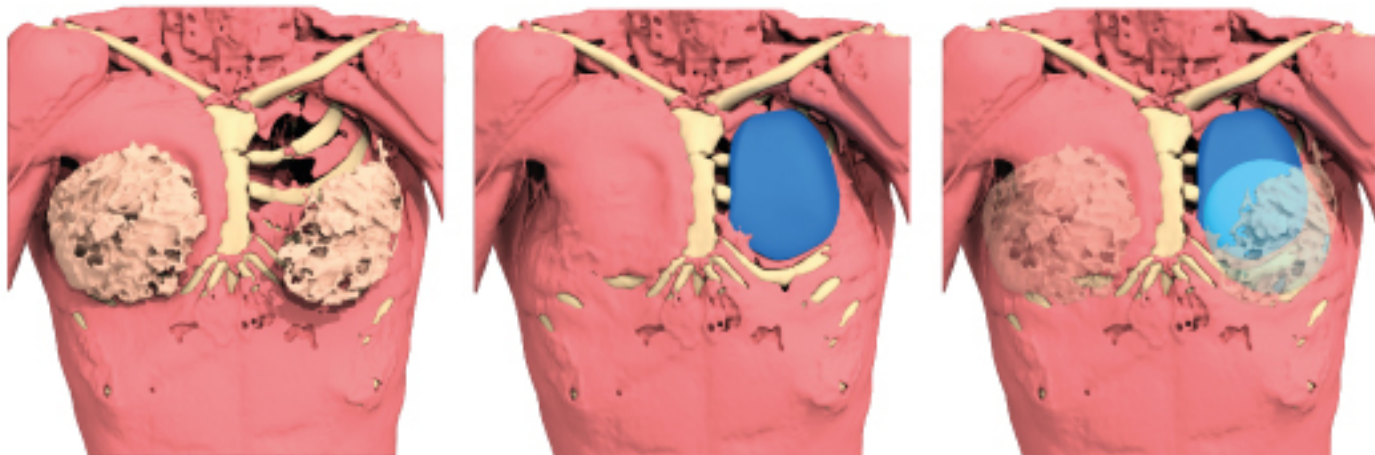




## SPECIFIC CASES

### Insertion of breast implant after Poland syndrome treatment

The first step is always to put the chest implant and correct the muscle defect. Then a breast implant will be used in a second procedure after 6 months. The creation of a fibrous wall avoids sliding.

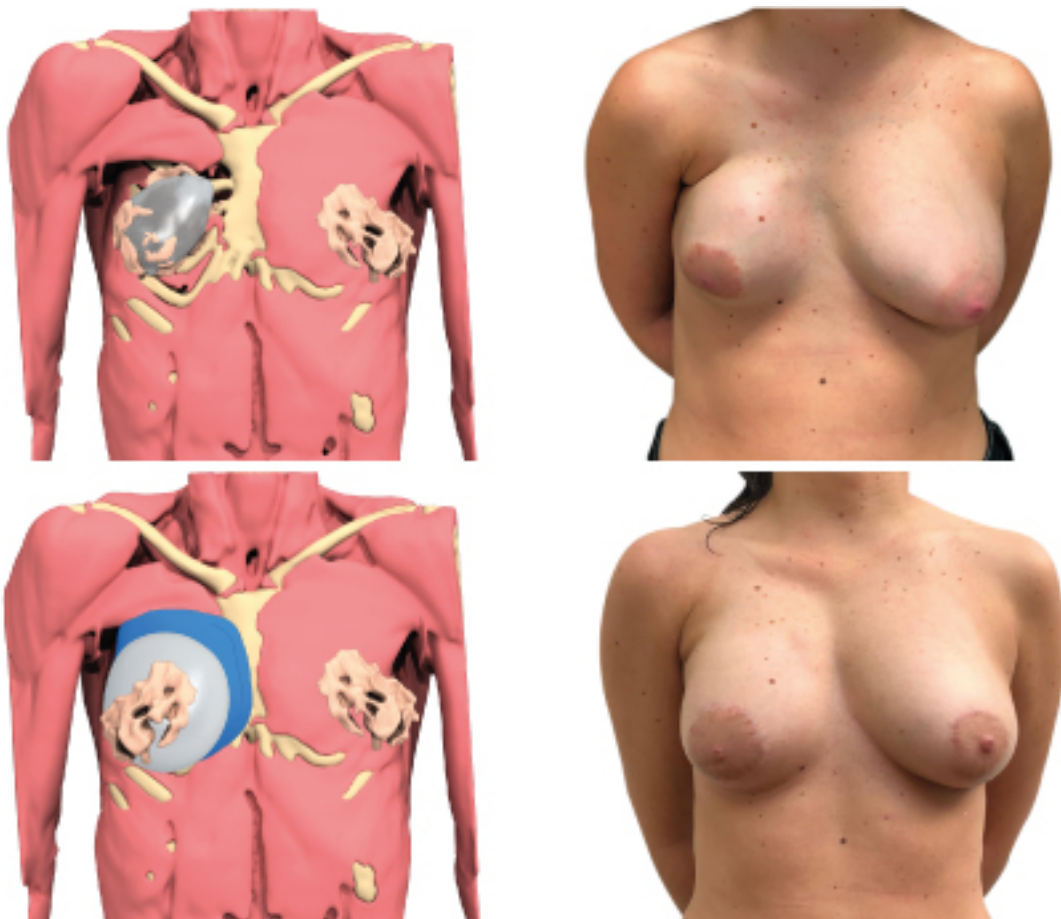


## Breast implant present before Poland syndrome treatment

One breast implant has been put subcutaneously to correct the Poland's breast atrophy in a primary procedure.

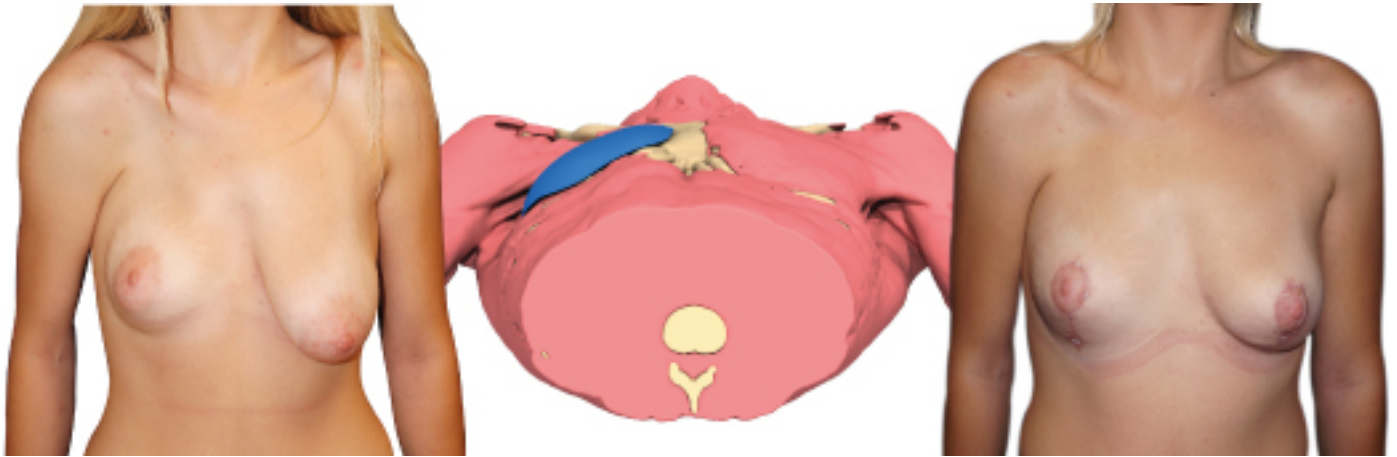
In a first step the 3D custom-made implant is inserted on the chest wall beneath the breast implant and its fibrous capsula let on place provisionally.

In a second step, after 6 months, the old breast implant is removed, the fibrous posterior wall respected and the new accurate breast implant is put in place without a risk of sliding on the previous one.



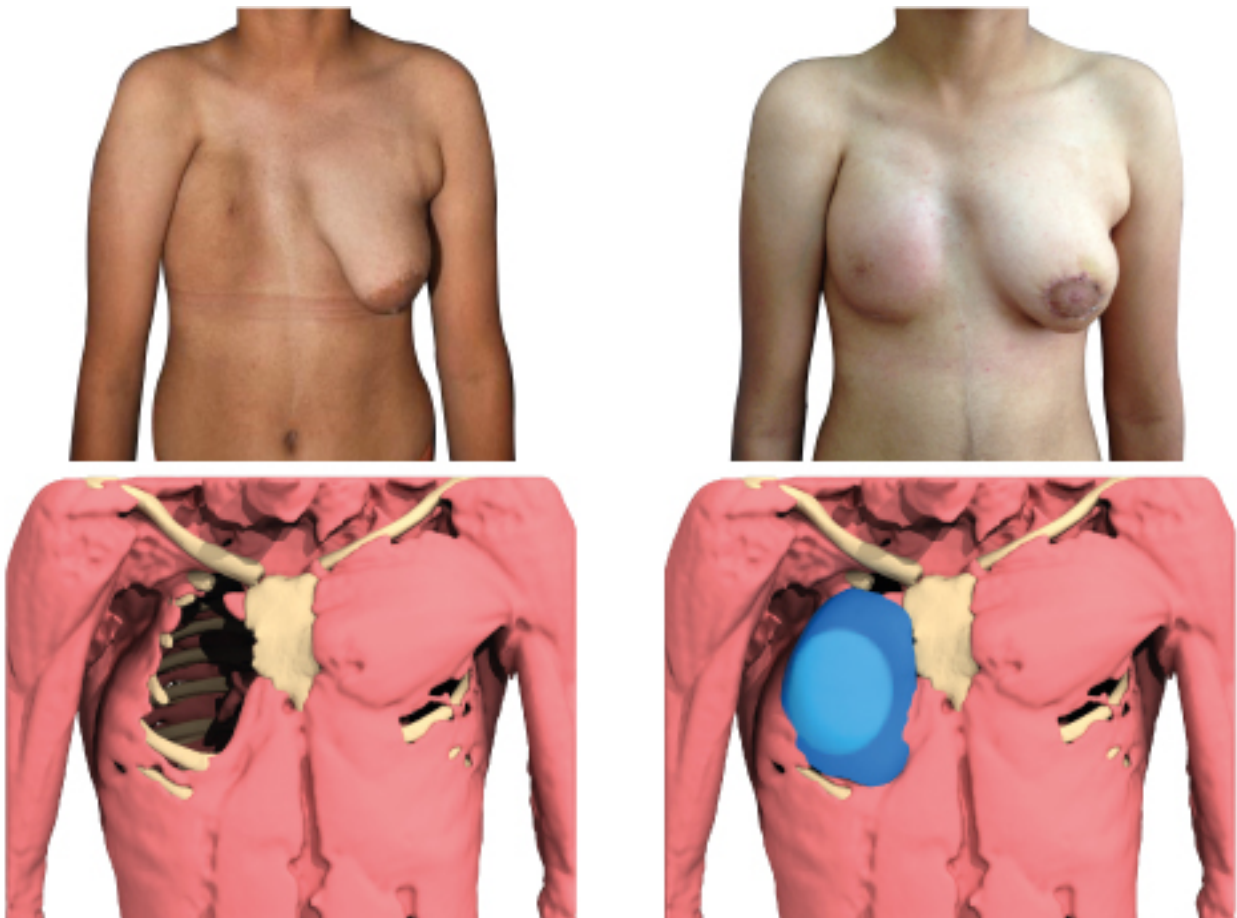
## Breast implant and breast plasty for tuberous disease after Poland Syndrome treatment

The first step is always to treat the Poland Syndrome deformity with the 3D implant. Then, 6 months later, a breast implant can be added, and in case of tuberous breast, the symmetrization of the two breasts and areolas can be treated.



## Poland Syndrome type 3 with deep chest deformity

The custom-made implant allows to correct both the thoracic deformity and the muscular deficiency. If necessary, 6 months later, a breast implant can be added on the Poland side, and the tuberous breast can be corrected for better symmetrization of the chest.



## SURGICAL OUTCOMES

- **D+1:** Checkup.

First puncture if necessary: patient lying sideways. The puncture is aseptic, this is made using a 19g trocar and one 60cc luer-lock syringe. Puncture should be made in the lower area of the scar in case of collection. The basic dressing is changed to a hydro-colloid Mepilex border EM 9x15 Monlyncke dressing. The chest vest restraint is put in place for 15 days. (Medical Z - Romeo).

- **D+2:** Checkup.

Control consultation. Dressing change. Often no seroma.

- **D+8:** Control consultation.

Dressing change. No seroma

- **D+15:** Control consultation.

Dressing removal.

Follow-up at three months (authorization for a progressive resumption of sports activity) and at one year.



References: thoracic jacket Medical Z Romeo

## SILICONE ELASTOMER PROPERTIES

The implant is made from a medical grade silicone elastomer and chosen according to its firm consistency in the medial part, flexible laterally and ending in "airplane wing". The introduction via a short approach is made easier by the possibility of folding it. The edges of the implant are very thin and therefore not visible.

This material is a foreign body, there is no immune «rejection» reaction, but a classic fibrous encapsulation which is an «exclusion» reaction and removes the risk of contamination by blood.

It is a solid rubber silicone elastomer: there is no risk of tearing, perforation or rupture, even in the long term. There is never any fibrous retraction (shell).

Unlike breast implants filled with silicone gel, these implants can be kept for life. With the implant being a smooth surfaced silicone elastomer and in the absence of a macro-textured surface, the long-term development of anaplastic large-cell lymphoma recently described for some breast implants has not been reported to date.

## BIBLIOGRAPHY

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Chavoïn J-P., editor. - **Pectus Excavatum and Poland Syndrome Surgery: Custom-Made Silicone Implants by Computer Aided Design** - Springer International Publishing 2019

## VIDEOS

Step by step surgery guide  
([bit.ly/Poland-syndrome-surgery](http://bit.ly/Poland-syndrome-surgery))



Webinar - Poland Syndrome Treatment  
([bit.ly/Webinar-Poland-syndrome](http://bit.ly/Webinar-Poland-syndrome))



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