

Sternal Reconstruction

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Incidence

- 0.5% - 2% worldwide

History

- Late 1800's – idea of median sternotomy conceived
- 1957- formally described by Julian
- Associated with high complication rates
 - Superficial infection rate- 5%
 - Mediastinitis – 0.4-6.9%
 - Significant morbidity & mortality (50-70%)

Introduction- Historical Management

- 1950's
 - Open drainage & granulation
 - Mortality 32-35%
- 1960's
 - Debridement, rewiring and closed irrigation
 - Mortality 15-20%

Introduction- Historical Management

- 1970's
 - Wide debridement of infected and non-viable tissue and closure with flaps
 - Lee-Omental flaps
- 1980's
 - Pectoralis major muscle transfer
 - Jurkiewicz – island rotation turnover
 - Nahai- advancement rotation

Païrolero and Arnold Classification

Classification

Type 1

Early dehiscence
Serosanguinous discharge
No deep infection

Type 2

First few weeks
Acute, purulent dehiscence
Deep infection present

Type 3

Months to years later
Chronic draining sinus track
Deep infection persists

Type 1



Type 2 - early



Type 2 - late



Type 3



Before and after



Classification

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Type 2

First few weeks
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Type 3

Months to years later
Chronic draining sinus track
Deep infection persists

Type 4

Chronic sternal instability

Principles

- Early detection
- Adequate debridement
- Eradicate infection
- Specific antibiotic cover
- Obliterate dead space
- Appropriate closure

High Risk Patients

- Obesity
- Chronic lung disease
- Diabetes
- Bilateral IMA Harvest
- Prolonged operation
- Radiotherapy
- Immunosuppression

Infection

- Superficial
- Deep

Options

- IV Antibiotics
- Closed Catheter Irrigation
- Rewiring
- Flap Closure

Flap Choice

- Pec major
 - Advancement
 - Unilateral
 - Bilateral
 - Turnover
- Rectus
 - Muscle
 - VRAM
- Omentum

Second Line Treatment

- Latissimus Dorsi
- Free flap

Flap Closure

- Removal of wires
- Debridement
 - Bone
 - Skin
- Regular Dressings/VAC
- Flap Closure ± Sternal Closure

Closure

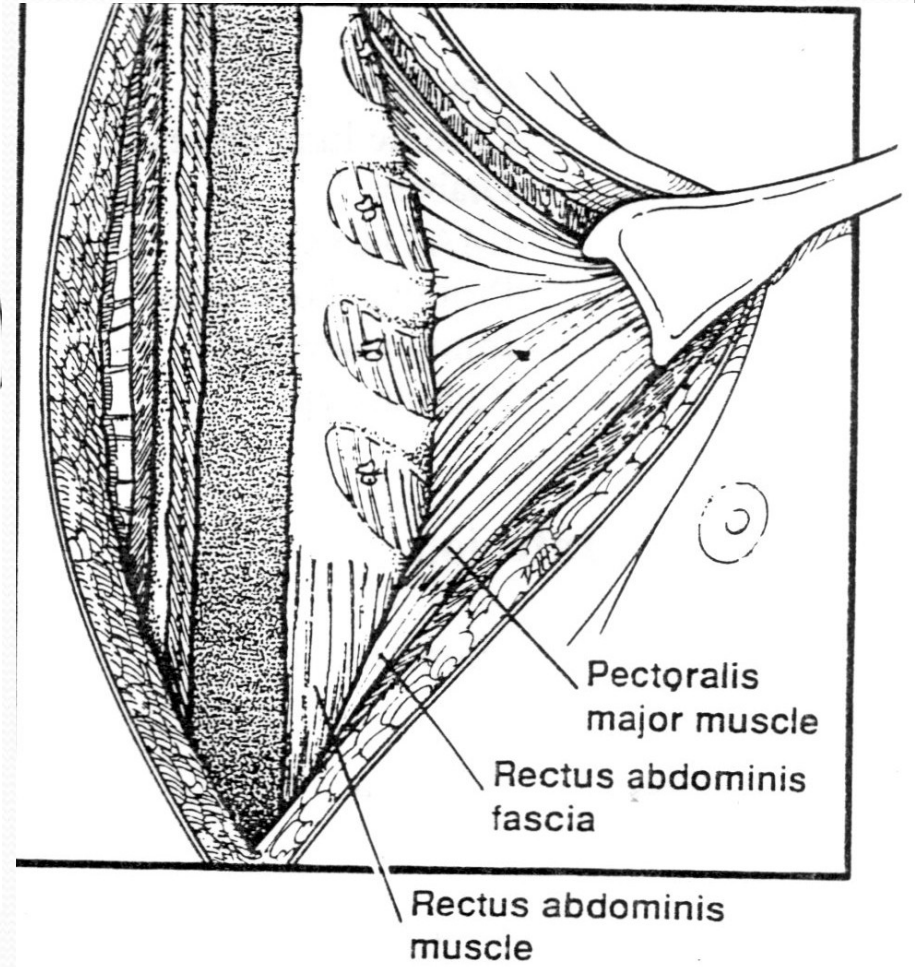
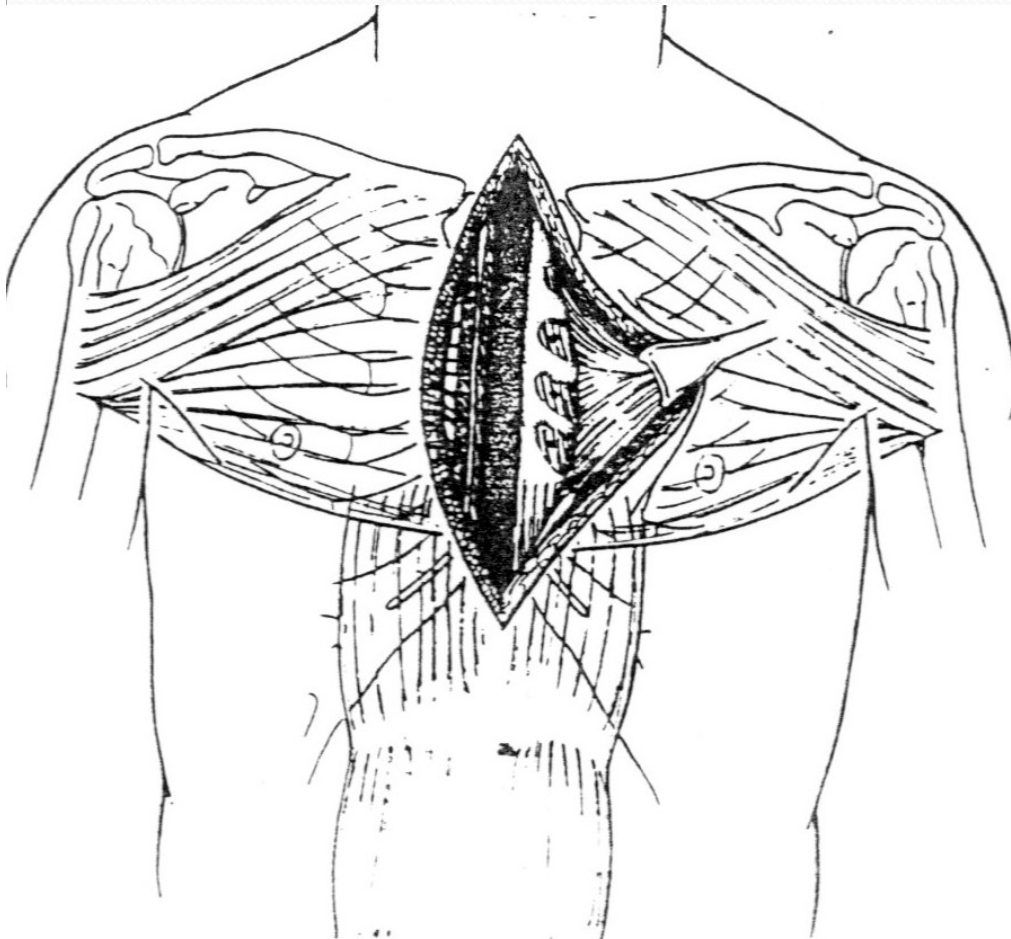
- Timing
 - Early
 - 1 stage
 - 2 stage
 - Late

WHEN?

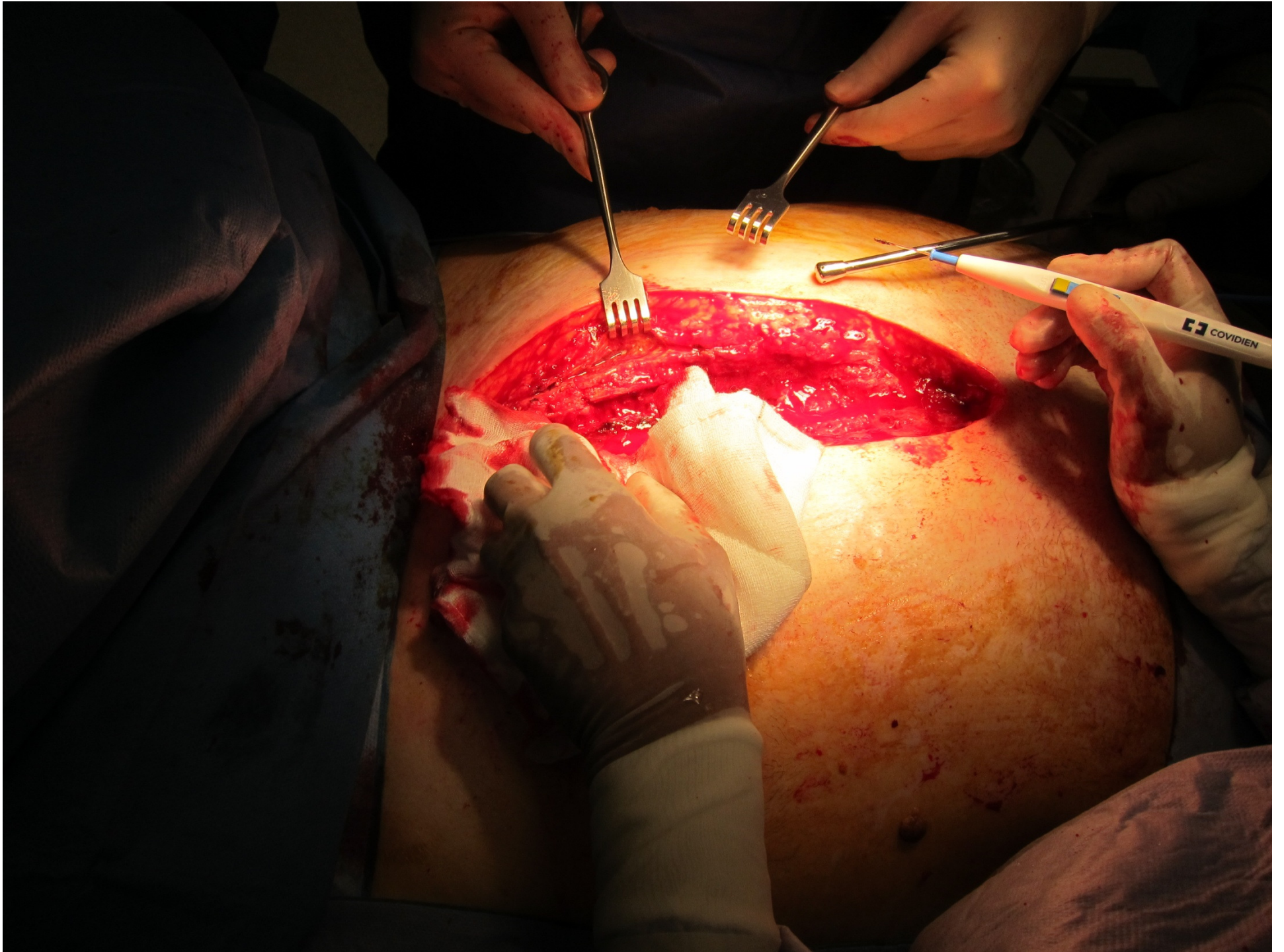
- Not septic
 - Afebrile
 - Clean wound
 - Off inotropes
- Maximum medical improvement

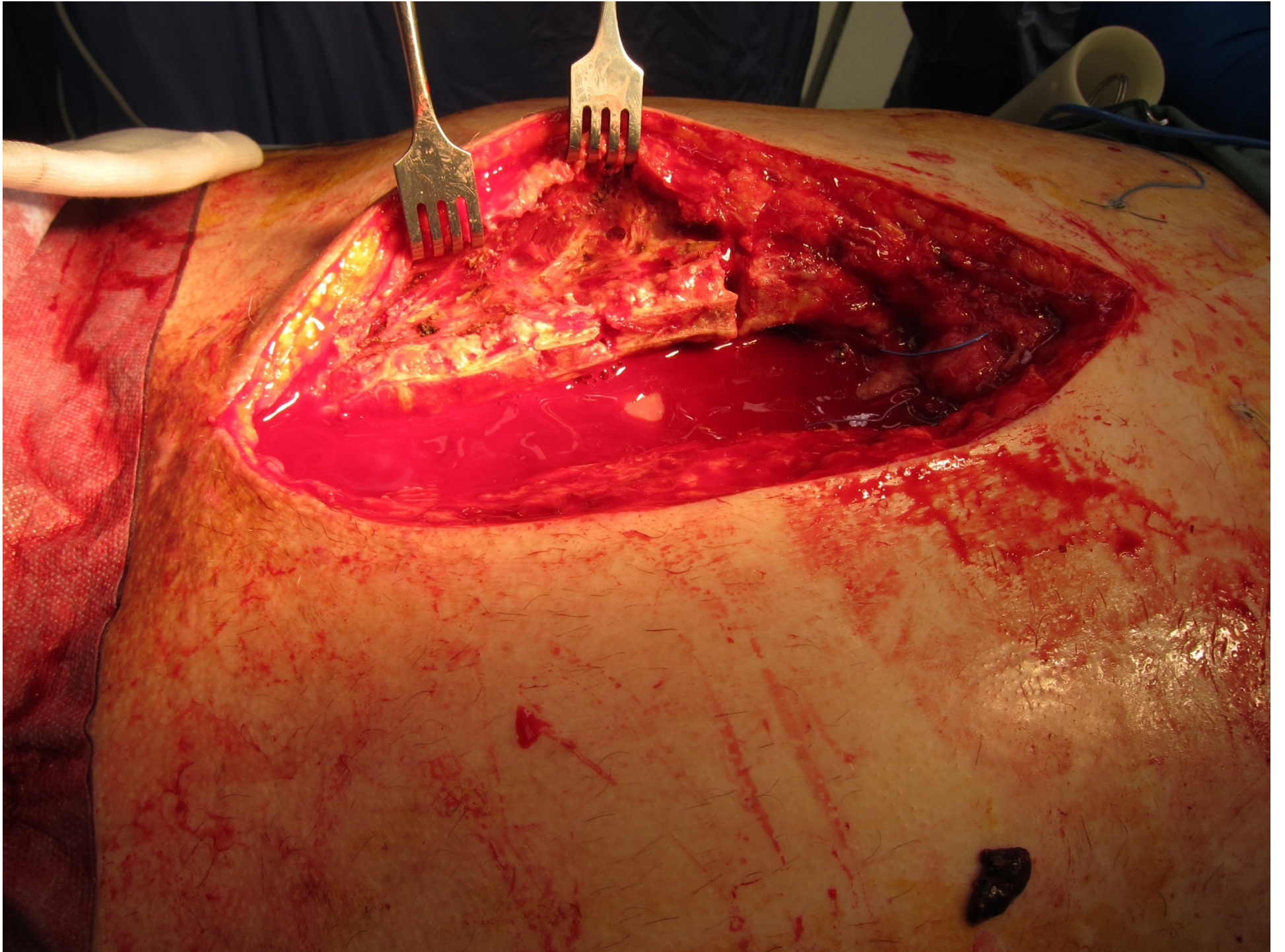
Closure

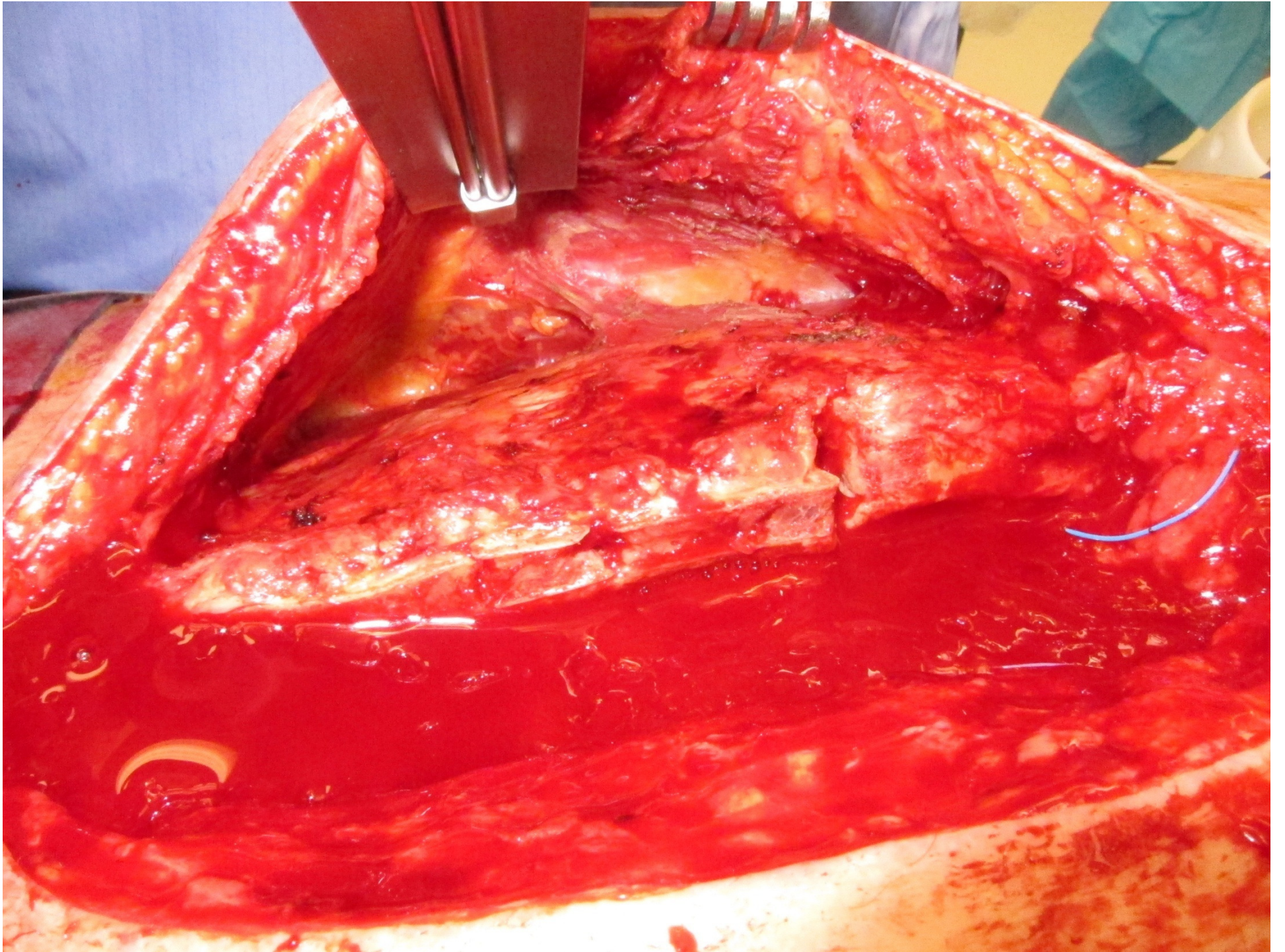
- Sternum
 - Rewire/Plate
 - Flap closure
 - Pec flaps
 - Rectus
 - Omentum
 - Suture sternum + flap closure
- Dead Space Obliteration

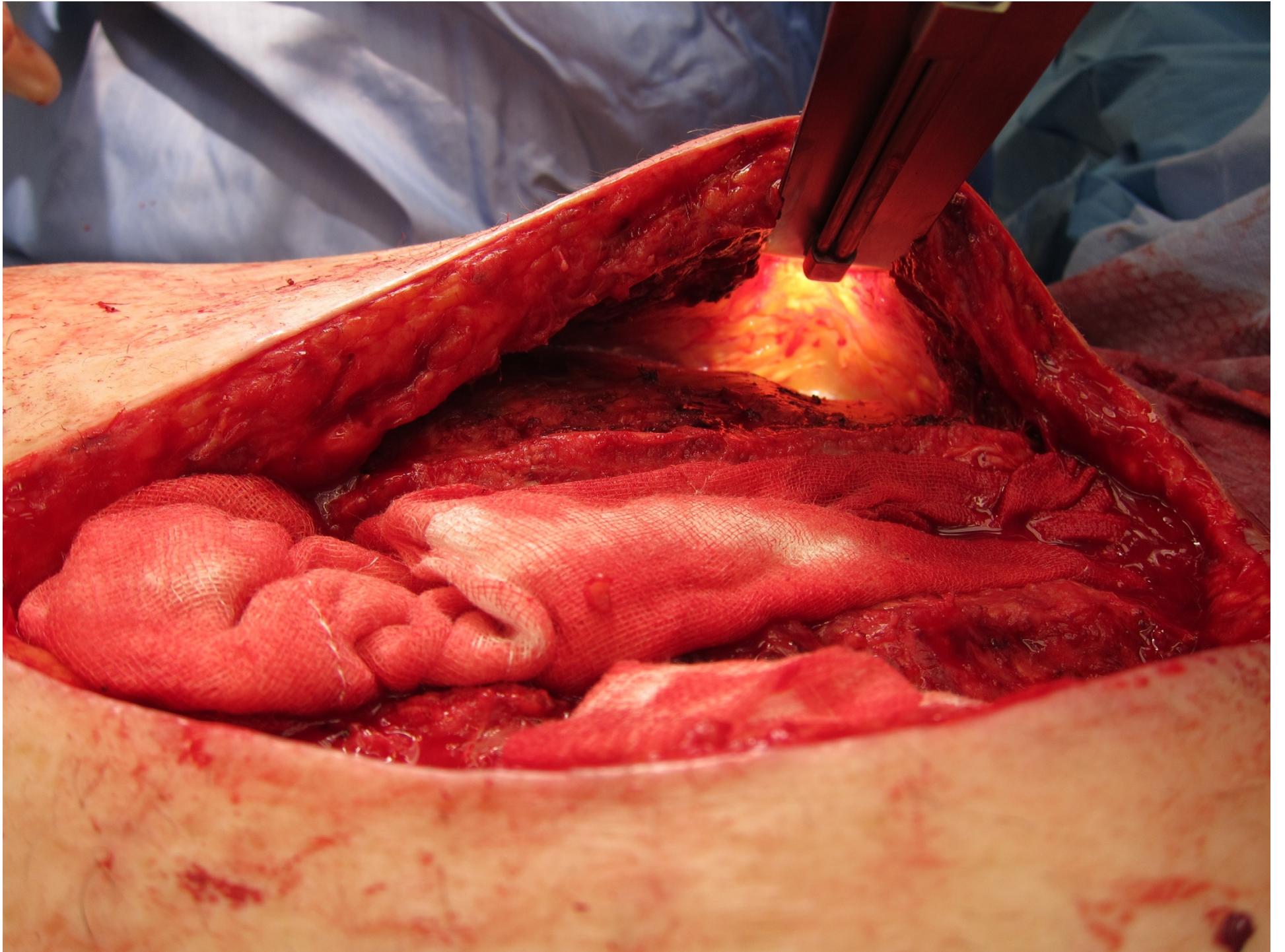


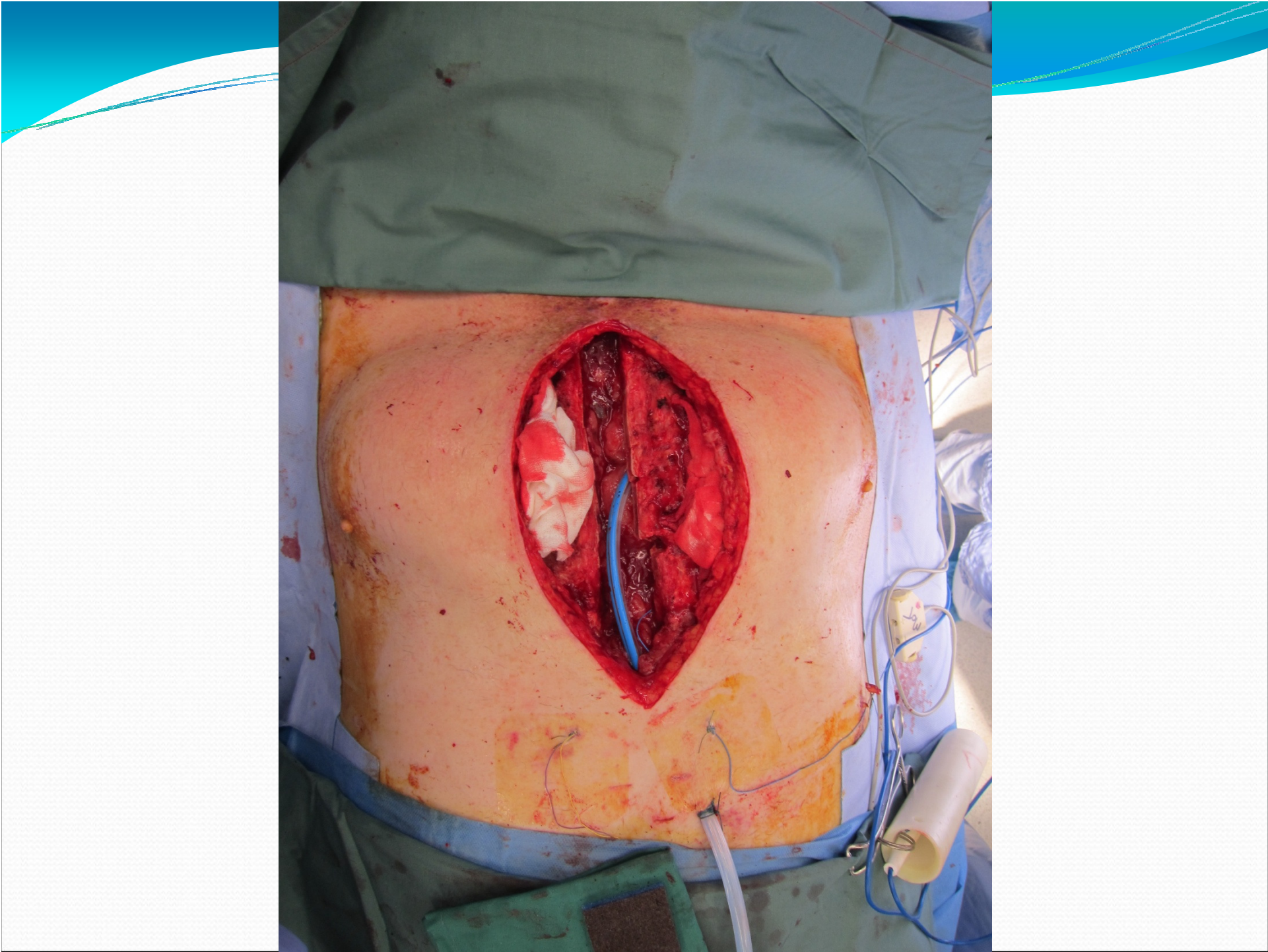




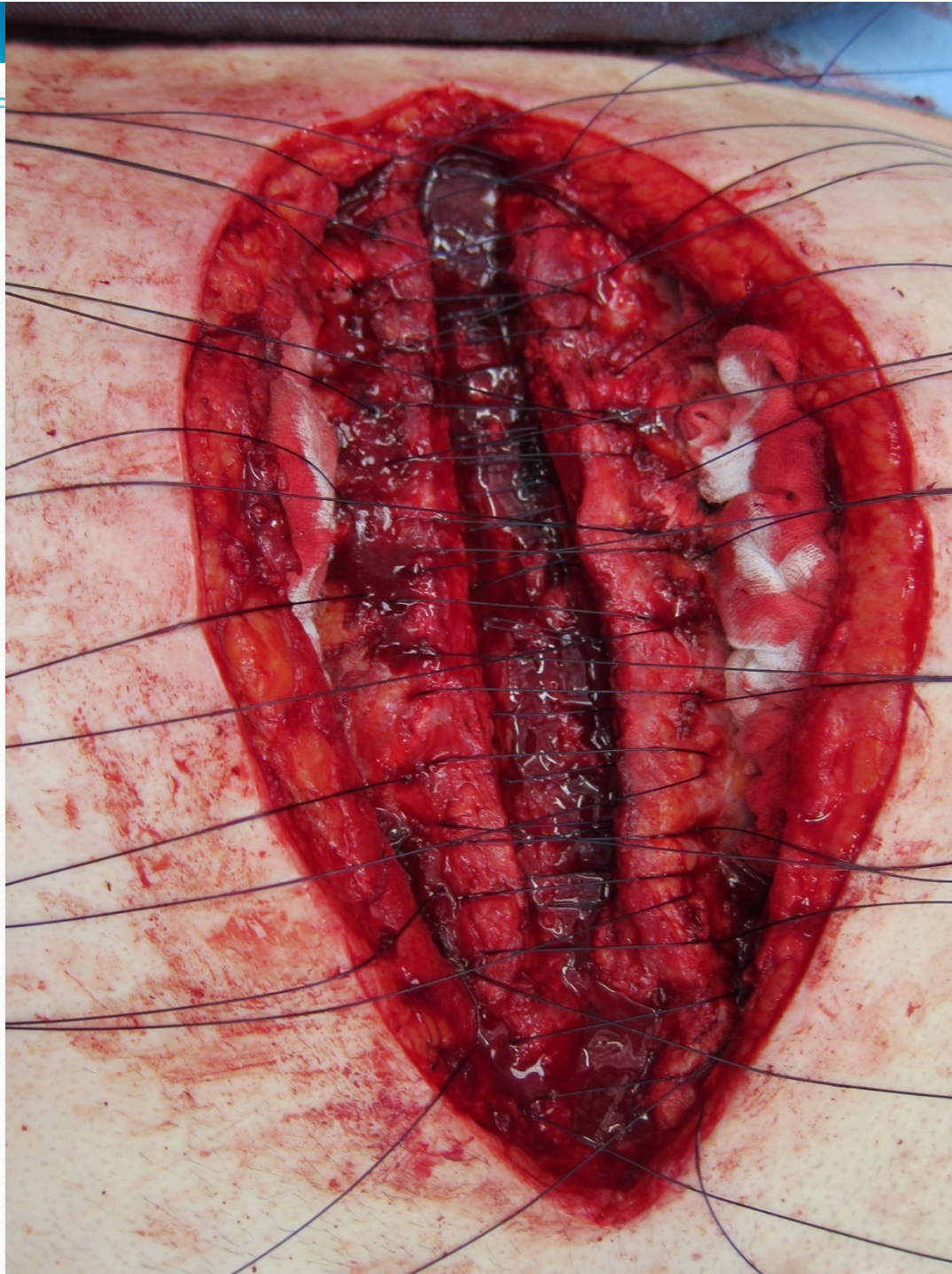




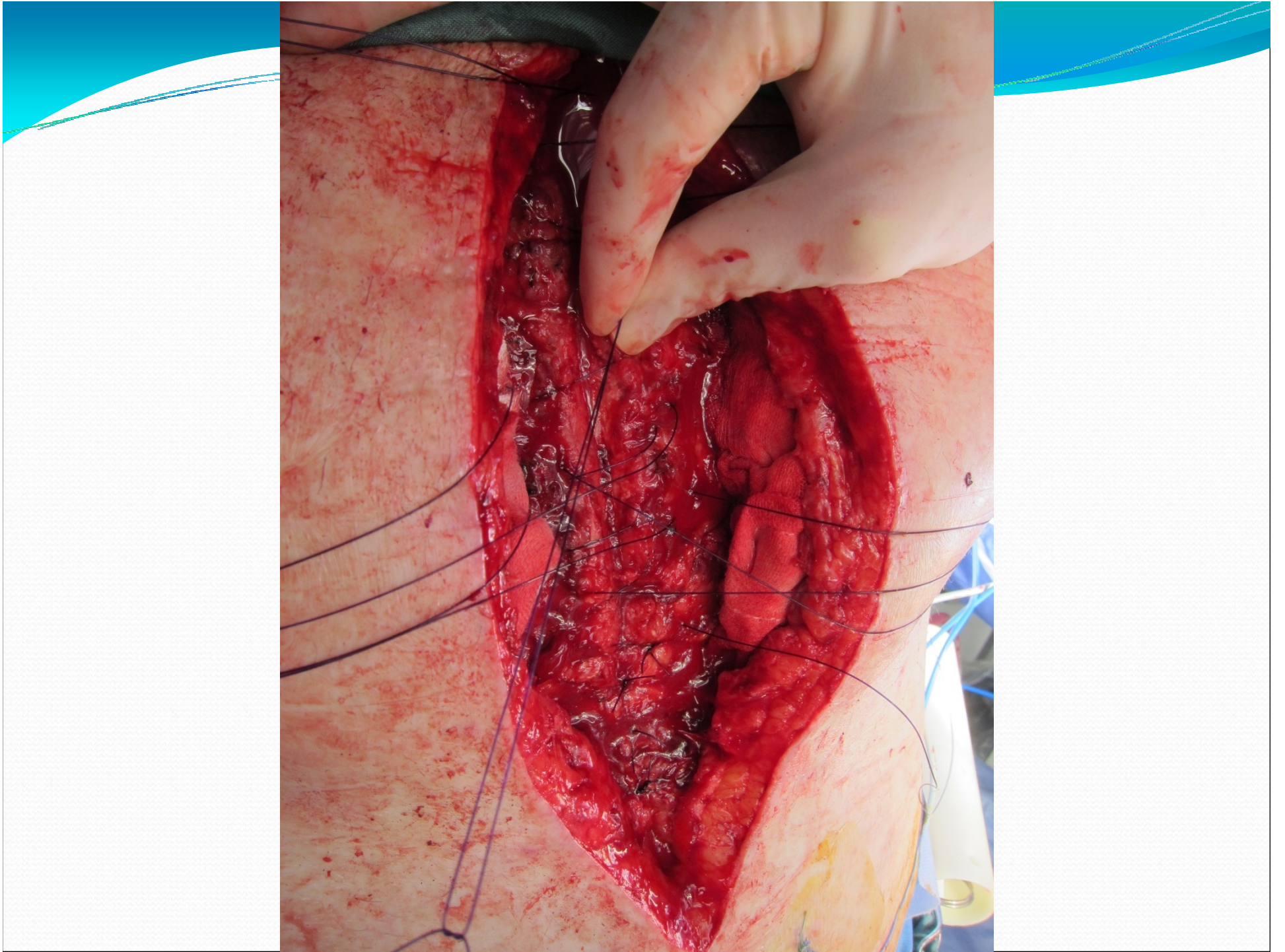






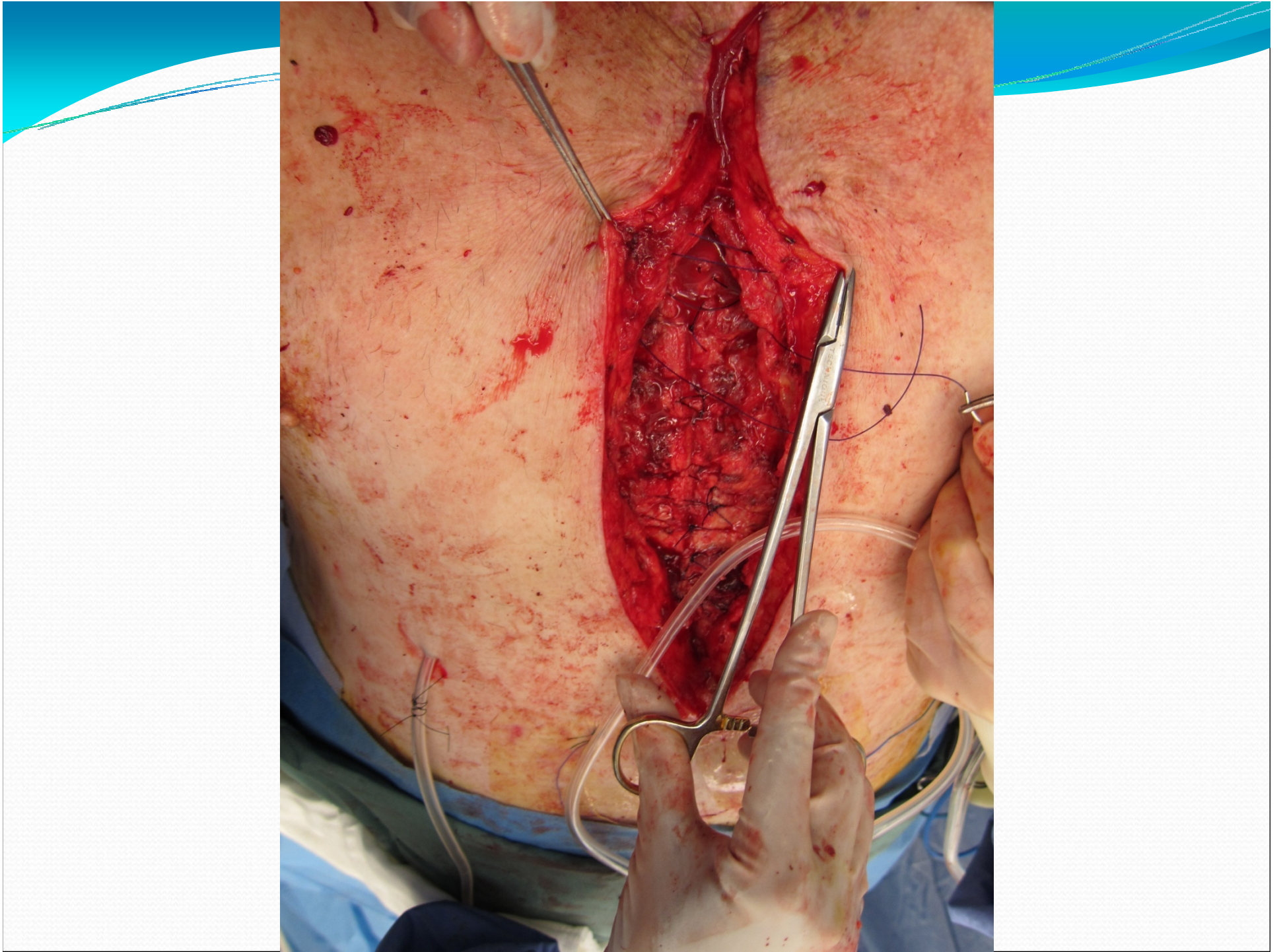






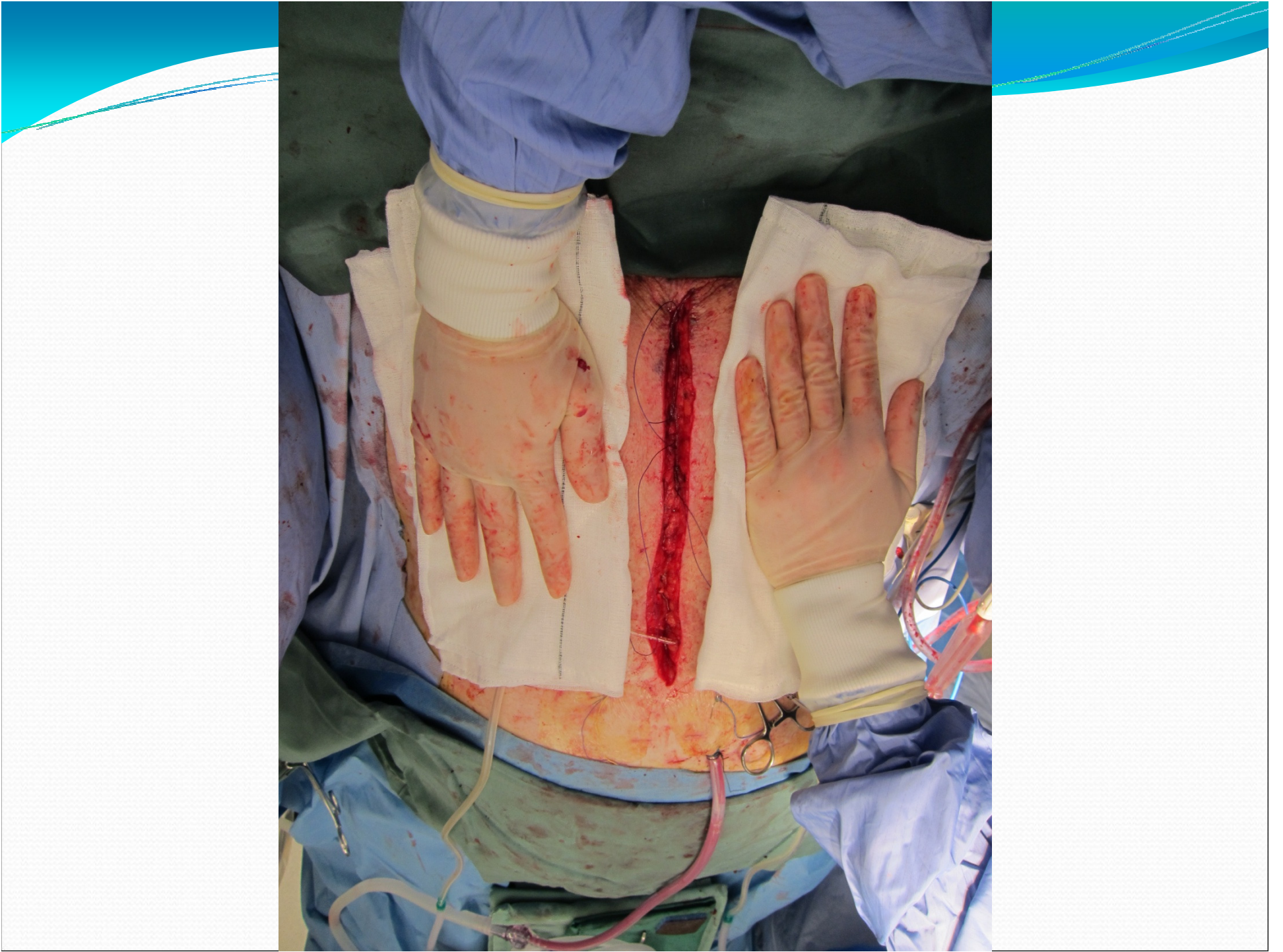


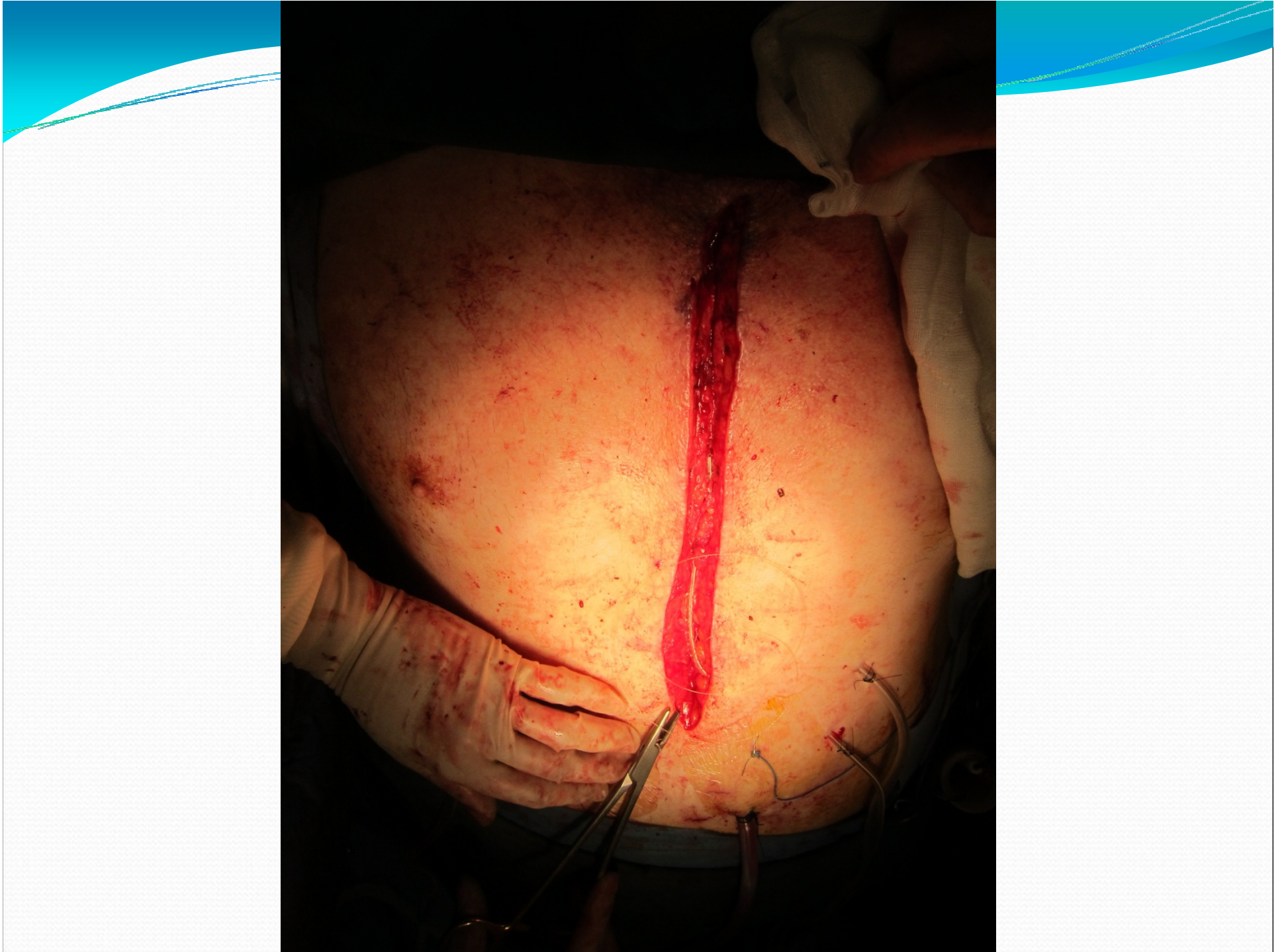














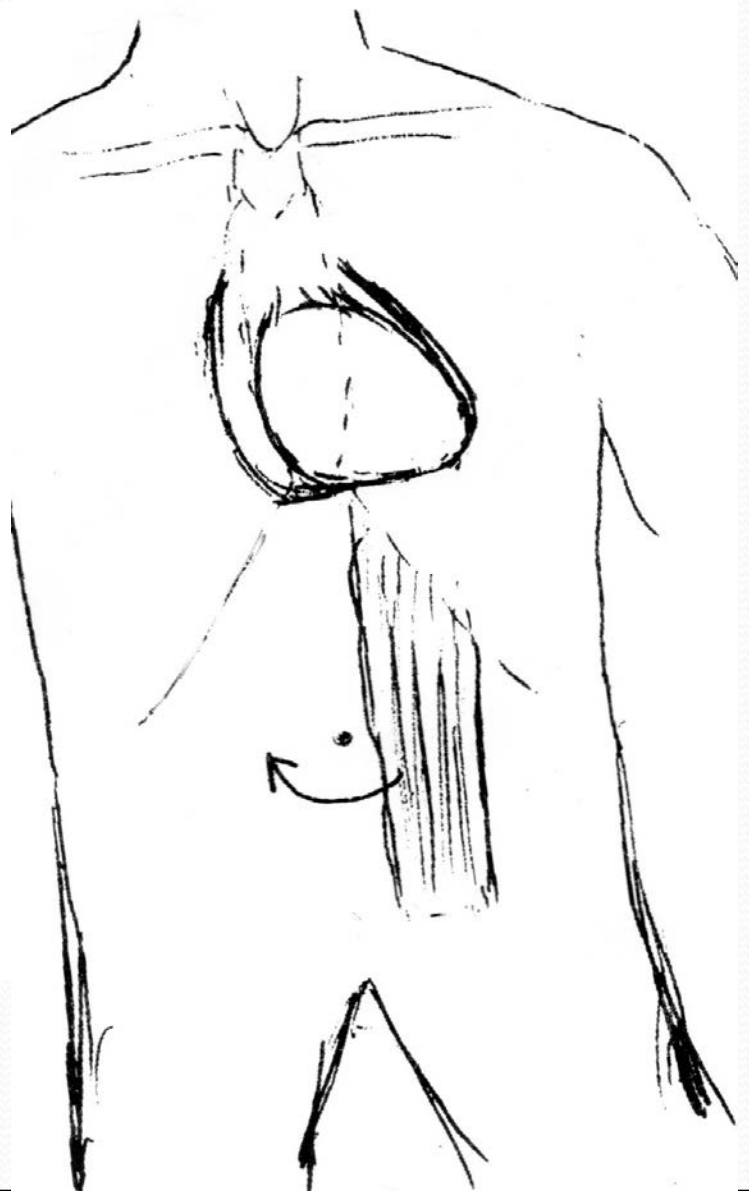
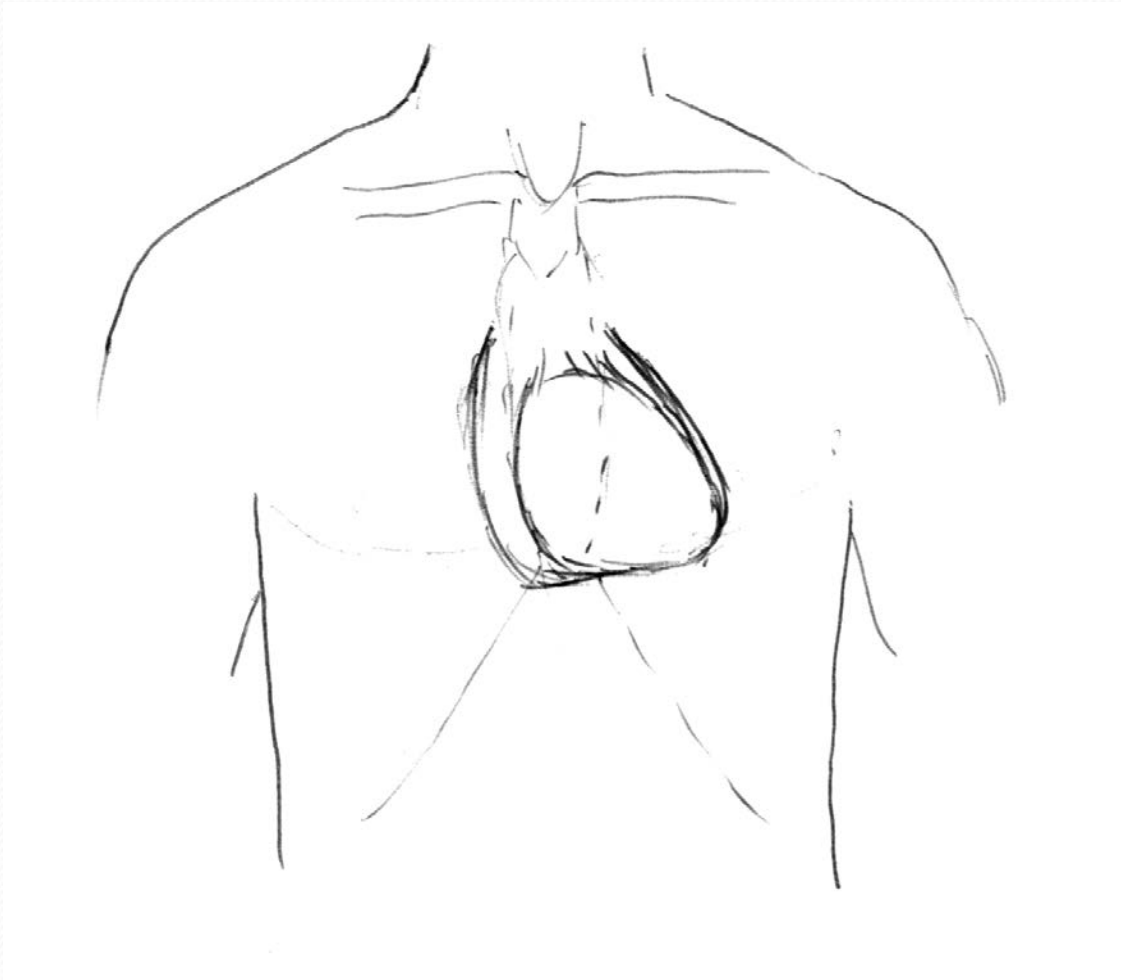


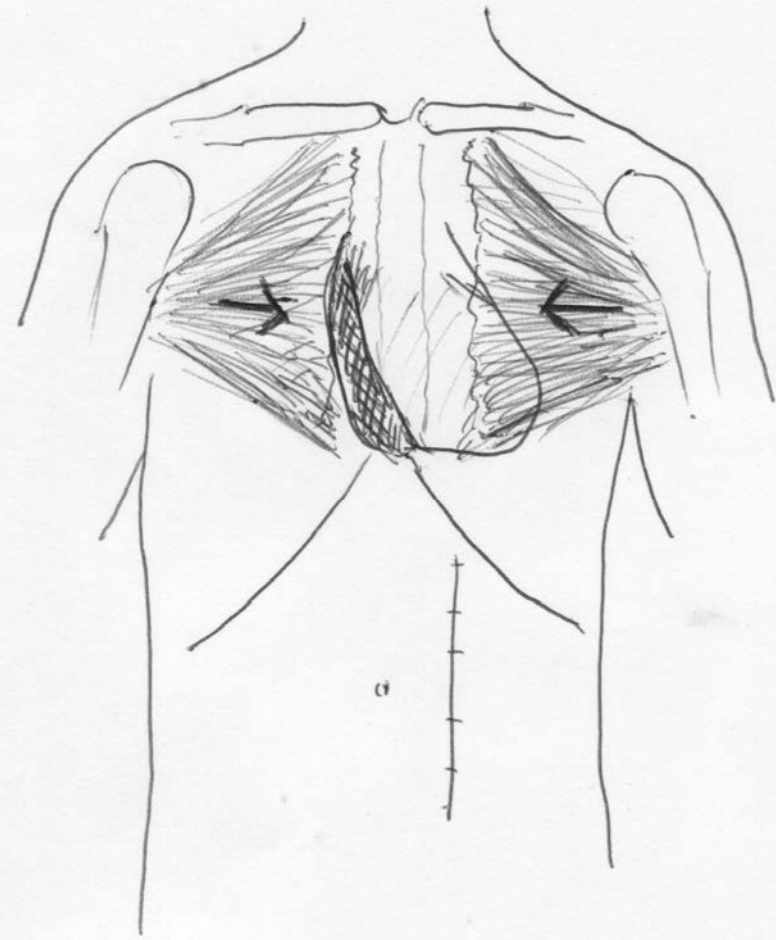
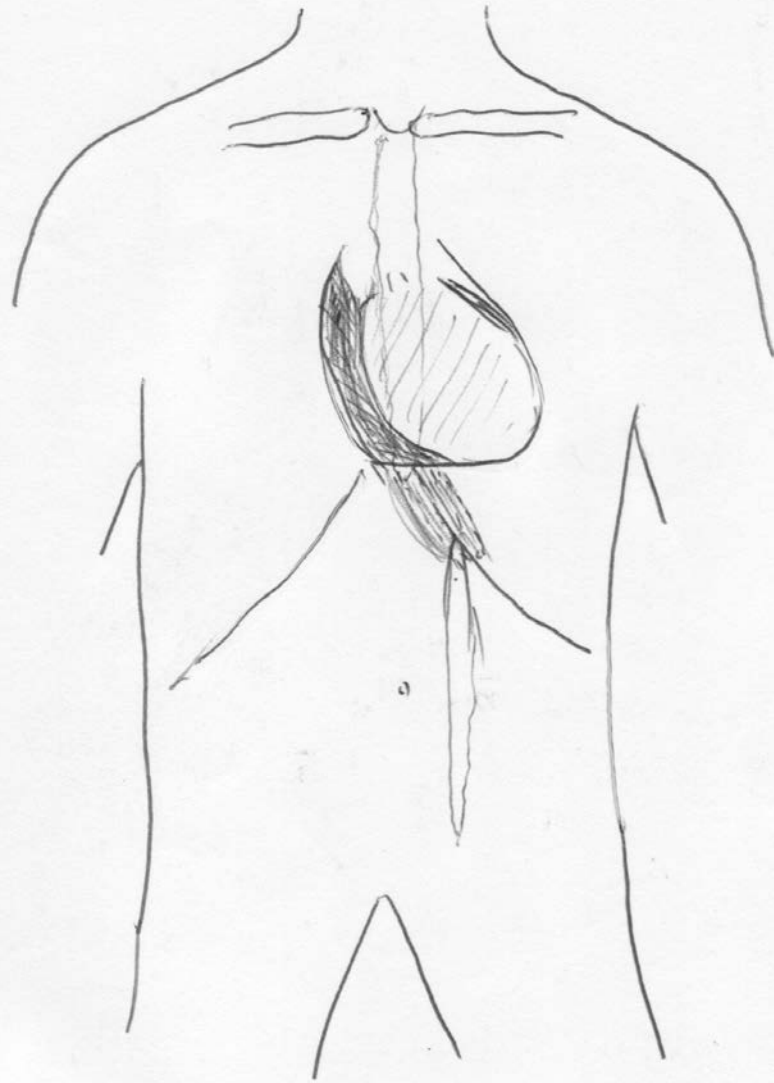
Post Op

- Arms by side
- Drains
- Dressings
- Antibiotics
- Mobility

Dead Space Obliteration

- Aortic root replacement
- Cardiac transplant
- Chronic abscess cavity
 - - Pec-turnover / tunnelled
 - Rectus
 - Omentum





Chronic

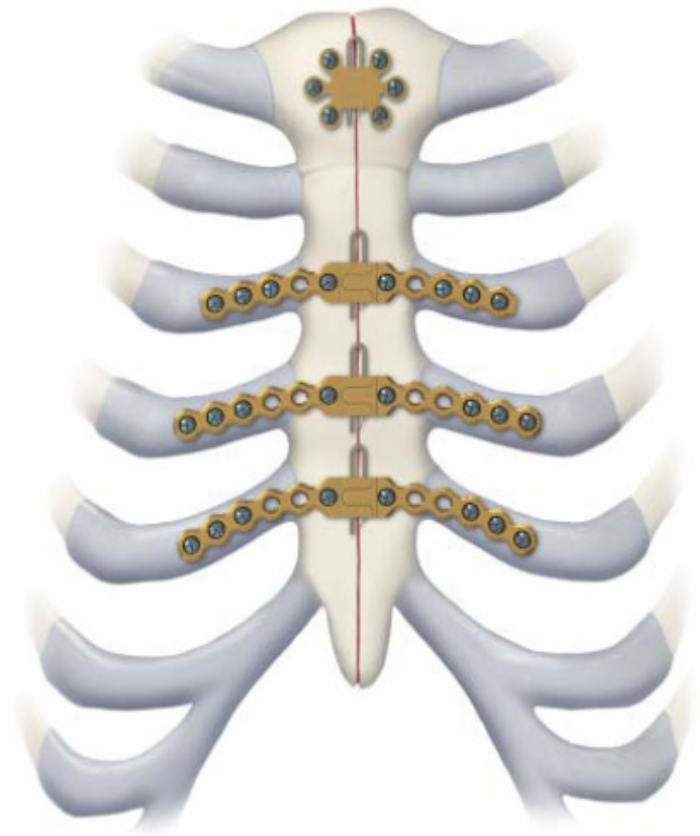
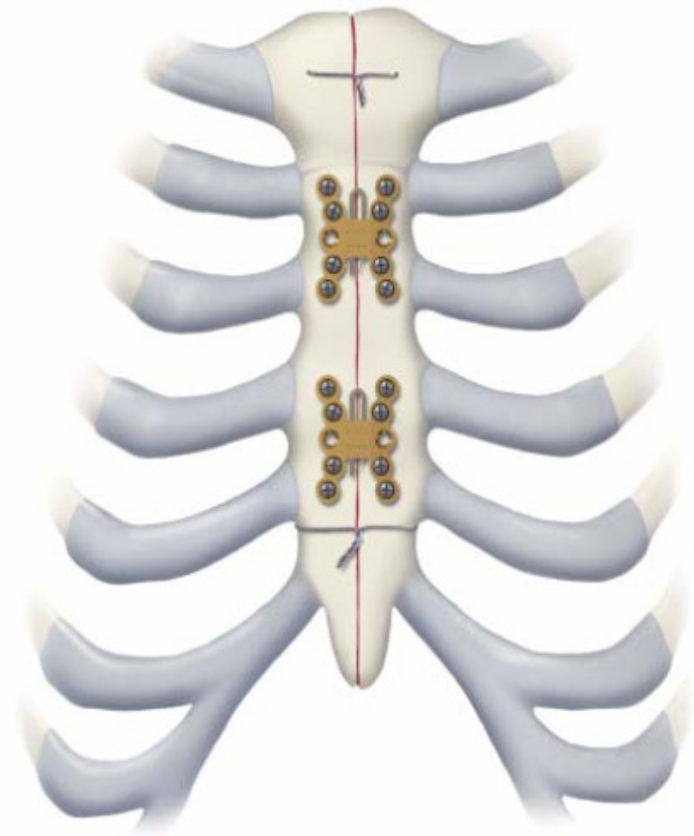
- Sinus
 - Sternal wires
 - Dead bone/cartilage
 - Foreign body
 - Infection
- Unstable Scar



Chronic Sternal Instability

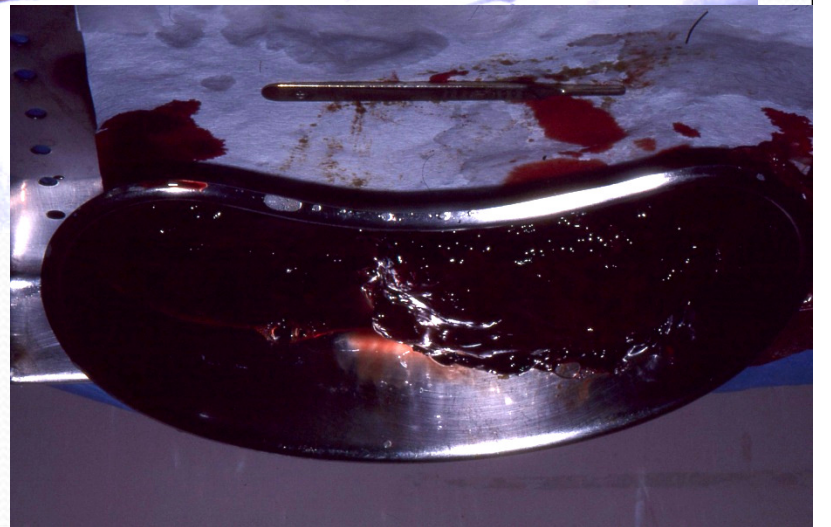
- Debride sternal edges
- Plate (Synthes plating system)
- Bilateral pec advancement flaps

Plating systems



Complications

- Early
 - Haematoma
 - Seroma
 - Infection
 - Necrosis
 - Skin
 - Flap
 - Dehiscence



Complications

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Complications

- Late
 - Recurrent infections/sinus
 - Pain
 - Chest
 - Scar
 - Contour Abnormality
 - Hernia
 - Sternal instability

Prophylaxis

- High risk patients
 - Significant osteoporosis
 - Morbid obesity
 - Previous mastectomy/radiotherapy
- Involve plastic surgeon early
- Initial sternal closure with PDS sutures and/or pectoralis flaps
- Limit arm movements and stress on sternum



Outcome

- 30 day perioperative deaths - 2.4%
- Intraoperative deaths - 0%
- One year overall survival - 88%

Causes of death

- Pulmonary sepsis
- AMI
- Renal failure
- Multiorgan failure
- Variceal bleeds





