



# Atypical Challenges for the Modern Vascular Surgeon

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M60 Vascular Meeting – Monday 19<sup>th</sup> September 2016

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# Groin abscesses in intravenous drug users

- Mr Samuel DeBono – Senior Clinical Fellow;
  - Scope of Problem.
  - Clinical Presentation and Treatment.
  - Outcomes.
- Cumbria and Lancashire Vascular and Endovascular Specialist Unit Experience.



# Bioprosthetic grafts for bypass surgery

- Mr Ravi Goel – Senior Clinical Fellow;
  - What is the Omniflow Graft?
  - When do I use it?
  - Clinical Outcome.
  - Global experience.
- Cumbria and Lancashire Vascular and Endovascular Specialist Unit Experience.



# Sartorius flap reconstruction for groin wound dehiscence – Therapeutic Strategies

- Mr Mark O'Donnell;
  - Clinical Problem.
  - Operative Indication.
  - Technique.
- Cumbria and Lancashire Vascular and Endovascular Specialist Unit Experience.



# Endoanchoring technology as a primary therapy or secondary adjunct for challenging aortic necks

- Mr Johnathan Porter – Specialist Trainee;
  - Background.
  - Clinical Indication.
  - Technical Issues.
  - Global experience.
- Cumbria and Lancashire Vascular and Endovascular Specialist Unit Experience.





# **“Groin abscesses in intravenous drug users” The Royal Blackburn Hospital Experience**

**Mr Samuel Debono, Mr Ravi Goel, Mr Mark O’Donnell**

**M60 Meeting – 19<sup>th</sup> September 2016**

**The Novotel, Worsley**

**Cumbria and Lancashire Vascular and Endovascular Specialist Centre**

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# Aims

- Review of intravenous drug use (IVDU) epidemiology and clinical presentation
- Explore our local problem at the Royal Blackburn Hospital over the last year for IVDU patients admitted with groin problems under the care of general and vascular surgeons
- Analyse admission data for IVDU patients
- Identify learning points and management guidance for future patients



# Injectable Drug Use

- Typically heroin, cocaine, methamphetamine



**Trainspotting**  
How do you get your hit?

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# Epidemiology

- 1 in 12 adults aged 16-59 (8.6%) has taken an illicit drug in the last year.<sup>1</sup>
  - The three most popular drugs are cannabis, powder cocaine, and ecstasy.
- Injectable drugs emerged as a problem in the 1980s. Highest numbers (300,000) in the 1990s. Numbers decreased in ages <25 and increased 35-64 years.<sup>2, 3</sup>
- Prevalence of drug injecting: 2.83 per 1,000 in North West (England average 2.49).  
NW has the highest number by region 13,110.<sup>4</sup>



# Presentation to Hospital

- Drug overdose<sup>5</sup>
- Systemic Infections
  - Blood-borne viruses<sup>6</sup>
    - HIV (1-3%)
    - Hepatitis B (16%) and Hepatitis C (30-80%)
  - Bacterial Endocarditis<sup>7</sup>
  - Community Acquired Pneumonia<sup>7</sup> (10x risk)
- Injection site infections (28%)<sup>8</sup>
  - Cellulitis – skin and subcutaneous tissues
  - Abscesses
  - Necrotising fascitis



# Presentation to Vascular Services

- Deep vein thrombosis (12-23%)<sup>9, 10</sup>
  - Post-thrombotic syndrome
  - Chronic venous insufficiency
- Arterial injuries
  - Pseudoaneurysms (mycotic)
  - Arteriovenous fistulas
  - Haemorrhage



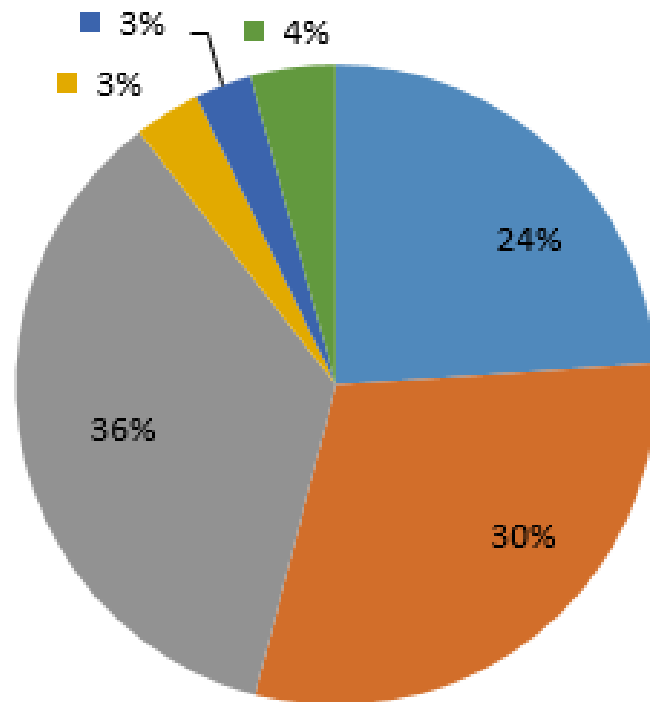
## Methods

- Data obtained from the Trust coding department with the following codes as primary diagnosis in the last 12 months (June 2015-June 2016)
  - Cutaneous abscess, furuncle and carbuncle of trunk (includes groin) (L02.2)
  - Cutaneous abscess, furuncle and carbuncle of limb (L02.4)
  - Aneurysms of lower limbs (L72.4)
- Details of the patients under the care of Vascular and General Surgical teams analysed using ICE / Clinical Portal IT Systems



## Results

- Total number of abscesses 209 in 186 patients



- Trunk & Abdominal Wall (50)
- Axillary & Upper Limb (63)
- Thigh & Groin (74)
- Labial (7)
- Perineal (6)
- Unclear (9)

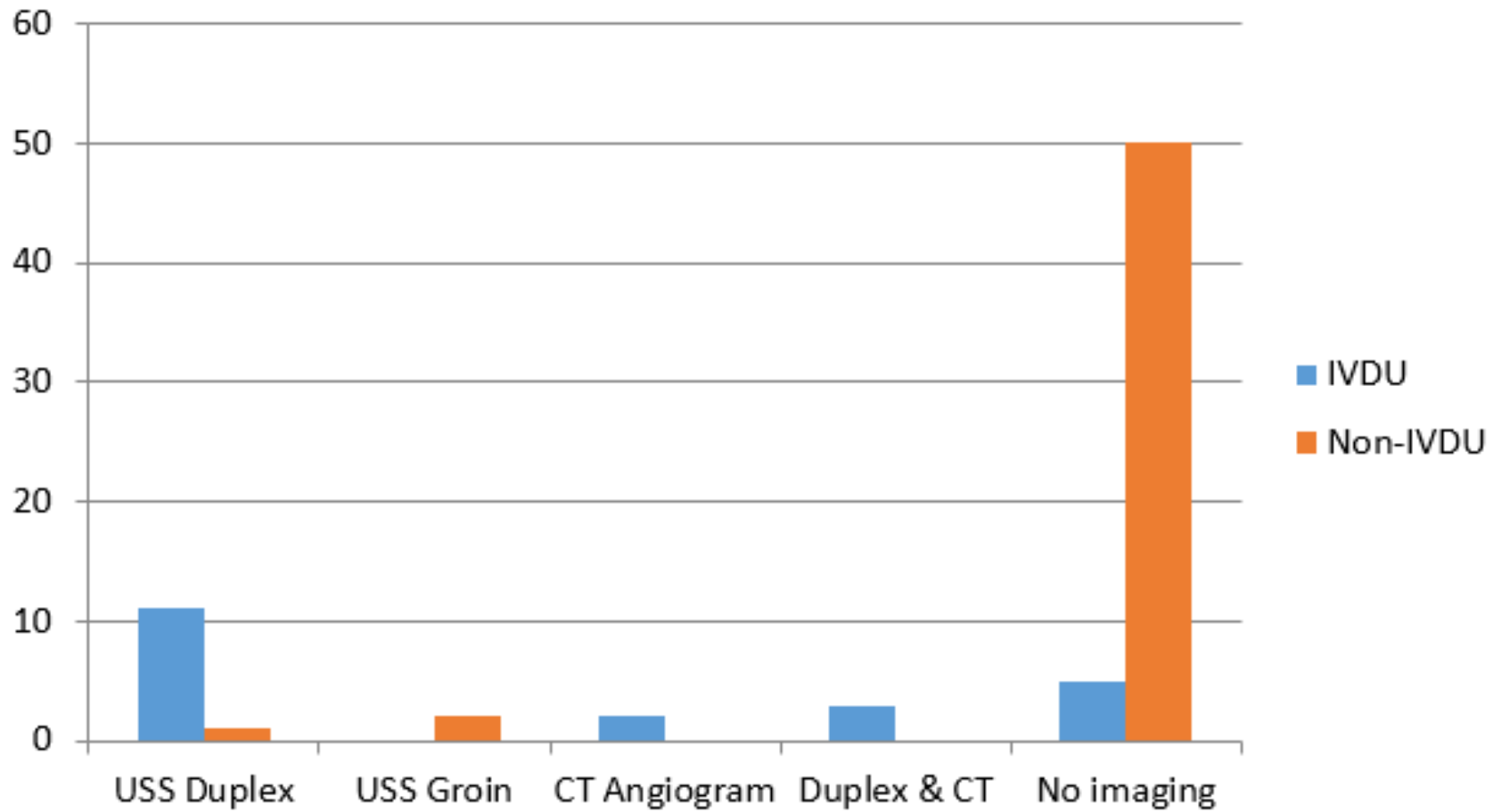


## Results – IV drug status

- 66 patients with thigh and groin abscess (74 episodes):
  - 48 patients were non-IVDU (52 episodes)
  - 1 ex-IVDU (1 episode)
  - 17 patients were IVDU (21 episodes)
    - 10 admissions under vascular surgery
    - 11 admissions under general surgery



## Results – Pre-operative Imaging



## Results – Treated IV Drug Users

- 17 patients
- Age range: 32 to 53 years (median 39 years)
- Duration of admission: 0 to 17 days (median 3 days)
- Co-morbidities
  - Presence of lower limb DVT: 10 (58%)
  - Positive for Hepatitis C: 4 (24%)
  - Positive for MRSA: 2 (12%)
  - Positive for HIV: 1 (6%)

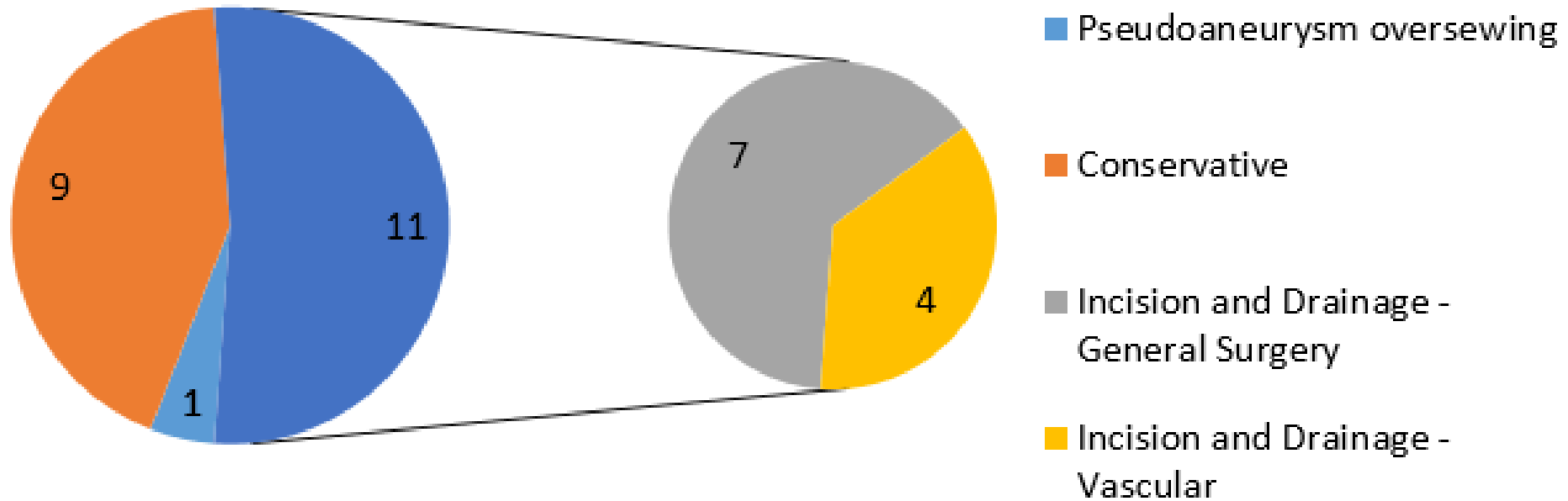




## Results – Treated IV Drug Users - Microbiology

| Growth          |   | Details                           | Antibiotic Sensitivity                        |
|-----------------|---|-----------------------------------|---|
| No sample sent  | 5 | One was MRSA +                    |   |
| No growth       | 4 |                                   |   |
| Mixed anaerobes | 4 | One also had Staph and one Strep  | Metronidazole or Add Clavulanate / Tazobactam |
| Streptococcus   | 3 | Two B-haemolytic. One Strep mitis | Amoxicillin                                   |
| Staph. aureus   | 4 | One blood culture                 | Flucloxacillin                                |

## Results – Operative Details



## Results – Conservative Management

|   |          |
|---|----------|
| Infected DVT                                      | 3        |
| Cannot distinguish between collection and vessels | 1        |
| Discharge against Medical Advice                  | 2        |
| Non-infected Sinus                                | 1        |
| Change of Wound Pack                              | 2        |
| <b>Total</b>                                      | <b>9</b> |



## Patient Outcomes

- 1 patient seen in OPD – healed
- 1 patient had an USS groin follow up – this showed resolving cellulitis.
- 8 patients were not offered follow up
- 3 patients failed to attend follow up and 6 self-discharged
- 2 patients died out of hospital (had evacuation of haematoma and oversewing of pseudoaneurysm; non-infected sinus not operated upon)



## Discussion

- Common for IVDU to have concurrent deep vein thrombosis. This can make diagnosing an abscess difficult. But can obviate the need for operative management.
- Two imaging modalities can be useful in diagnostic uncertainty.
  - Two patients were being treated conservatively with antibiotics for infected DVTs therefore a deep-seated abscess needed to be excluded with CT angiography.



## Discussion

- The patient who had a pseudoaneurysm had a duplex scan which showed a haematoma with no flow within it. Therefore a high index of suspicion is required.
- Microbiology results comparable to previous bacteriological studies of skin and soft-tissue infections in IV DU
  - 63% aerobes vs. anaerobes (57%)<sup>11</sup>
  - Staphylococcus aureus being the most common aerobic isolate



## Conclusions

- IV drug users are a challenging group of patients to manage due to low rates of compliance.
- Care of these patients may be done safely by the general surgical team, however, close liaison with the vascular team and early pre-operative imaging can better guide their management.



## Recommendations

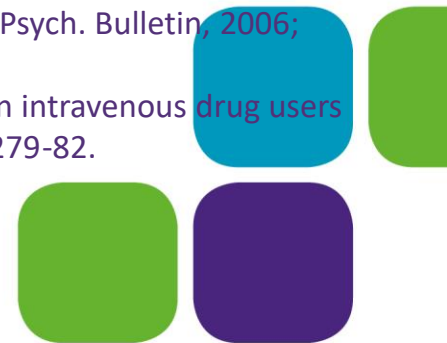
- IV drug users with groin problems should be admitted under the general surgeon.
- The vascular surgeon should be involved following pre-operative imaging unless clinical need indicates otherwise.
- Pus for culture and sensitivity should be sent in all patients undergoing incision and drainage.
- Antibiotic therapy should cover gram-positive and anaerobic species.





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# Bioprosthetic grafts for bypass surgery

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M60 Vascular Group Meeting

19<sup>th</sup> September 2016

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# Disclosure

- No disclosures declared.
- No financial relationship with content.



# Learning Outcomes

- What is a Bio-prosthetic graft ?
- Why do we need such a graft ?
- Cumbria and Lancashire Vascular and Endovascular Specialist Centre experience.
- Current global evidence.
- Tips & Tricks.



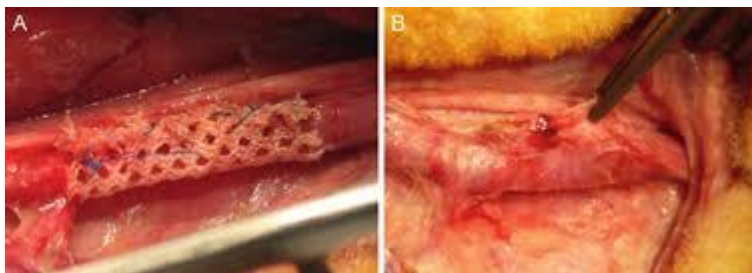
## What Is a BioProsthetic Graft – Omniflow Graft

- Composite of cross-linked ovine collagen with a polyester mesh endoskeleton.
- Polyester mesh provides strength and durability with resistance to aneurysm formation.
- The biocompatible structure encourages rapid incorporation into the host tissue leading to revascularization of the wall and resistance to infection.



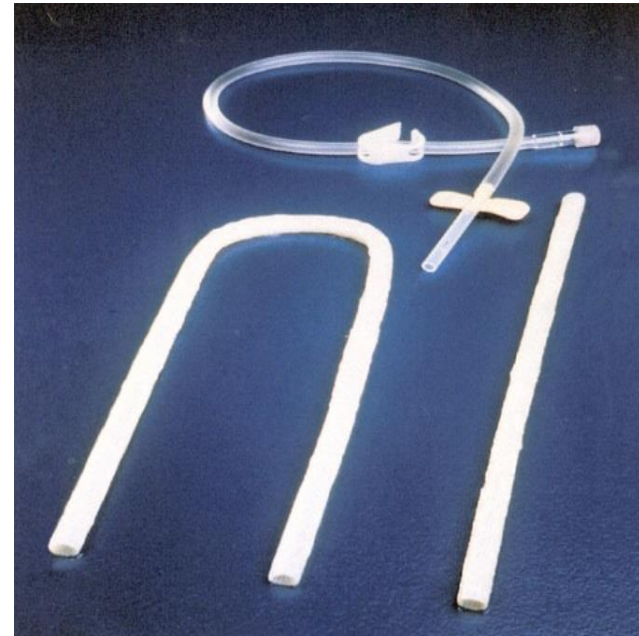
## Omniflow Graft Manufacturing

- Under sterile condition polyester mesh endoskeleton is implanted at sheep's back.



## Available Graft Shapes and Sizes

- Shape:
  - Straight.
  - Curved.
- Diameter:
  - Straight : 5, 6 and 8 mm.
  - Curved: 6 mm.
- Length:
  - Straight: 20 – 65 cms.
  - Curved: 30 – 45 cms.





## When and Where to use - Omniflow Graft

- Suitable autograft not available.
- Infected prosthetic graft.
- Dialysis access.





## When and Where to use - Omniflow Graft

- Suitable autograft not available.
- Infected prosthetic graft.
- Dialysis access.
- Primary adjunct ???



# Graft Preparation

- Saline wash.
- Heparin lock.



# Advantages of OmniFlow Graft

- **Haemocompatible;**
  - Smooth.
  - Non-thrombogenic lumen.
- **Biocompatible;**
  - Rapid integrity in host tissue.
  - Resistant to infection.
- **Non-porous;**
  - No seroma formation.
  - No tissue ingrowth.
- **Good compliance;**
  - Minimal hyperplasia.
  - Handles like vein.



## Our Experience

- Recent introduction to the Trust.
- Four grafts implanted (April 2016 – August 2016).
- Used for primary bypass surgery.
- Patient Demographics:
  - Ages: 51-58 years.
  - All male patients.
  - On statins and anti-platelets.
  - All current smokers.



## Our Experience

- Indications for use:
  - No suitable vein.
  - For chronic critical limb ischaemia.
  - Fem above-knee popliteal bypasses.
  - Two implanted in the same patient - bilateral.
- Outcomes:
  - Patency - 50%:
    - One graft patent for 4 months and the other for 3 months.
  - Occlusion – 50%:
    - Two cases – occlusion due to the kink in the graft and other due to the absence of run-off vessels.



# Global Experience

## ■ Dünschede, F et al. – 2016

- Prospective study – Critical limb ischaemia.
- 123 Patients with Omniflow II implantation between 2006-14;
  - 62 - Popliteal bypass - primary and secondary patency rates were 34 % and 69 % respectively after 5 years with limb salvage of 98%.
  - 61 – Crural bypass - primary and secondary patency rates were 32 % and 34 % respectively after 5 years with limb salvage of 70%.

## ■ Dünschede, F et al. – 2015

- Retrospective study – Intermittent claudication, critical limb ischaemia. popliteal artery aneurysm and acute limb ischaemia patients.
- 141 Fem-Pop bypasses with Omniflow II implantation between 2006-13;
  - Primary patency was 34% after 5 years.
  - Secondary patency was 69% after 5 years.
  - Limb salvage 95%.



# Global Experience

## ■ Dünschede, F et al. – 2015

- Retrospective study – Critical limb ischaemia.
- 27 Omniflow II implantations for crural bypasses between 2007-12;
  - 12 crural bypasses were conducted with adjuvant distal arteriovenous fistula as a means to increase bypass flow in the presence of severely impaired intraoperative runoff or revision for early failure.
  - 15 bypasses were performed in the crural position without fistula.
  - Limb salvage rate after a median observation time of 19 months was 92% and 60% for the fistula and non-fistula groups respectively.

## ■ Koch, G et al. – 1997

- 274 Omniflow II implants – femoro-popliteal or crural regions.
- Implant chosen for patency, susceptibility to infection and low aneurysm formation rates.
  - Patency rate for above knee bypasses was 61.9% after 3 years with good vascular periphery and 44% for patients with poor run-off.
  - Patency rate for below knee bypasses was 55.4% after 3 years with good vascular periphery and 35.3% for patients with poor run-off.
  - Patency for the femoro-crural bypass was 28.7% after 2 years.
  - The rate of infection was 0%.
  - Post-operative bypass aneurysmal rate was 1.1% (n=3).



# Vascular Graft Infection – The Problem !!!!



Should I use Omniflow, Evidence??





# Global experience in Graft infection

- Krasznai, A G et al. 2015
  - Omniflow II was used for in situ reconstruction after excision of infected aortic grafts in three cases.
  - After a mean follow-up of 2.2 years, no occlusion, degeneration, or rupture and structural integrity and no anastomotic dehiscence.
  - One patient suffered from graft reinfection.
- Witberger, G et al. 2014
  - Nine patients - 7 with positive cultures and 2 with no microbial growth.
  - Primary and secondary patency rates at 19 months were 66.6% and 78% respectively.
  - One patient had high above knee amputation due to clinical deterioration.



# Global experience in Graft infection

- Fellmer, PT et al. 2014
  - Eight patients - 5 with positive cultures and 3 no growth.
  - Eight month follow up 7 out of 8 cured of infection.
  - Primary patency and secondary patency after 12 months was 63% and 75% with limb salvage 88%.
  - One amputation due to clinical deterioration and one unsuccessful thrombectomy.
  
- Al Shakarchi, J et al. 2016
  - Case Series and Review article for Omniflow graft for dialysis.
  - Case series described three cases at high risk of infections – good flow demonstrated at 3 months with no infection.
  - Four studies reviewed identified 236 procedures.
  - One-year primary and secondary patency rates were 60.1% and 82.1% respectively.
  - Infection rates are reported at 0% to 5.7%.
  - Aneurysmal rates ranged between 0% and 6.8%.



## Tip and Tricks – Learning Points

- Modelling grafts ends – cut like a prosthetic graft not like a vein.
- Make sure no laxity – prone to kinking and this is vital when extending to below knee vessels.
- Remember that patients still warrant best medical therapy and long-term antibiotics if placed in infected fields.



## Conclusion

- There is a learning curve.
- Results are encouraging.
- Certainly there is a potential for the use of bio-prosthetic grafts, both in the non-availability of suitable autologous graft and in infected prosthetic graft.
- Could this be used as the second line conduit after vein when its not available ?
- There is a need of multinational and multicentre study to ascertain the use of bio-prosthetic graft.



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# Sartorius flap reconstruction for groin wound dehiscence – Therapeutic Strategies

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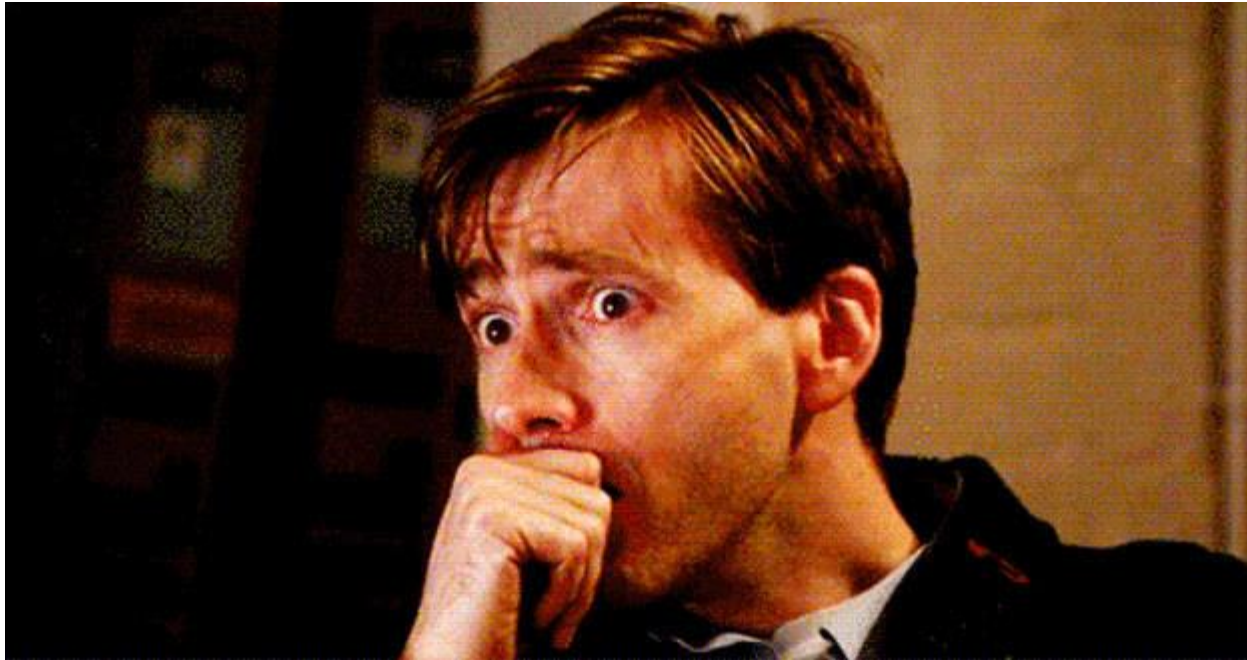
# Learning Outcomes

- Evaluation of clinical presentation.
- Exploration of graft infection classification and causative factors.
- Review of investigative modalities.
- Analysis of therapeutic intervention strategies.
- Cumbria and Lancashire Vascular and Endovascular Specialist Centre experience.





# Vascular Graft Infection – The Problem !!!!



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- Surgical site infection (SSI) after open surgery for lower extremity revascularisation is a serious complication that is associated with a more than twofold increased risk of early graft loss and re-operation.



## Vascular Graft Infection – The Problem !!!!

- Surgical site infection (SSI) after open surgery for lower extremity revascularisation is a serious complication that is associated with a more than twofold increased risk of early graft loss and re-operation.
- Fortunately graft infections remain uncommon occurring in less than 5% of cases.
- However, they have a **high morbidity and incidence of amputation and death.**



# Vascular Graft Infection – The Problem !!!!

- Multicentre audit of complex wound and graft infections (n=55);
  - 31% mortality.
  - 33% amputation rate.
  - Only 45% left hospital alive without amputation.
    - Naylor et al, *Eur J Vasc Endovasc Surg* 2001; 21: 289-94.



## Causes

- Occurs most commonly by inoculation of bacteria from the patient's skin at the time of surgery.
- Direct contamination or spread during the initial surgery or immediate post-operative period.
- Peri-operative malaise.
- Post-discharge complication.



# Risk Factors

- Patient:
  - Elderly, female gender, obesity, care home residence.
  - Diabetes, renal failure.
  - Steroid therapy, recurrent antibiotics.
  - Presence of haematoma, open wound or recent angiography.
- Pre-operative shaving – when?
- Procedure;
  - Redo-surgery.
  - Emergency surgery.
  - Duration greater than 4 hours.
  - Choice of conduit – autologous vs. prosthetic.



# Prevention

- Patient optimisation including MRSA screening.
- Antibiotic prophylaxis in accordance with local protocols.
- Patient physiology:
  - Normothermia.
  - Maintenance of glucose homeostasis.
- Operative technique:
  - Pre-operative patient washing ??
  - Anatomical marking.
  - Aseptic technique and precise tissue handling.
  - Theatre sterility and laminar air-flow.



# Clinical Presentation





# Clinical Presentation

- High index of suspicion.
- Systemic upset, pyrexia of unknown origin, weight loss.
- Superficial Grafts:
  - Erythema overlying graft.
  - Spreading cellulitis or abscess formation.
  - Haematoma.
  - Discharging or bleeding wound. or bleeding.
- Deep-set Grafts:
  - Vague pain.
  - Herald sign such as gastro-intestinal bleed, distal emboli, hydronephrosis or tissue erosion.



# Classification

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| Groups | Szilagyi  | Samson  | Karl-Storck  |
|--------|---|---|--|
| I      | infection involves only the dermis  | infections extend no deeper than the dermis   | Superficial infection without involvement of the graft               |
| II     | infection extends into the subcutaneous tissue but does not invade the arterial implant | infections involve subcutaneous tissues but do not come into grossly observable direct contact with the graft                   | Partial graft infection without involvement of the anastomosis       |
| III    | the arterial implant proper is involved in the infection                                | infections involve the body of the graft but not at an anastomosis  | involvement of the anastomosis and suture line                       |
| IV     |   | infections surround an exposed anastomosis but bacteremia or anastomotic bleeding has not occurred                              | Wound disruption and complete exposure of the graft/patch            |
| V      |   | infections involve a graft-to-artery anastomosis and are associated with septicemia and/or bleeding at the time of presentation | All the above groups with concomitant septic bleeding/pseudoaneurysm |
| VI     |   |   | All the above groups with graft thrombosis or septic emboli          |



# Management – Considerations

- 1) Graft excision.
- 2) Surgical field debridement.
- 3) Restoration of vascular flow.
- 4) Intensive and prolonged antibiotic therapy.



# Management – General Principles

- Once infection confirmed, semi-urgent expert planning warranted to pre-empt catastrophic haemorrhage, graft thrombosis or systemic collapse.



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- An infected prosthesis, acting as a foreign body, is essentially extravascular rendering bacteria inaccessible to antibiotics.
- Conservative measures including prolonged antibiotic therapy, drainage & irrigation of abscesses and covering muscle flaps may be helpful and buy time. **BUT THEY ARE RARELY CURATIVE.**



# Microbiological Evaluation

- Initial broad spectrum or hospital policy protocol based therapy.
- Culture result information gathering.
- Adjustment of antibiotic therapy.
- Consideration of long-term venous access.



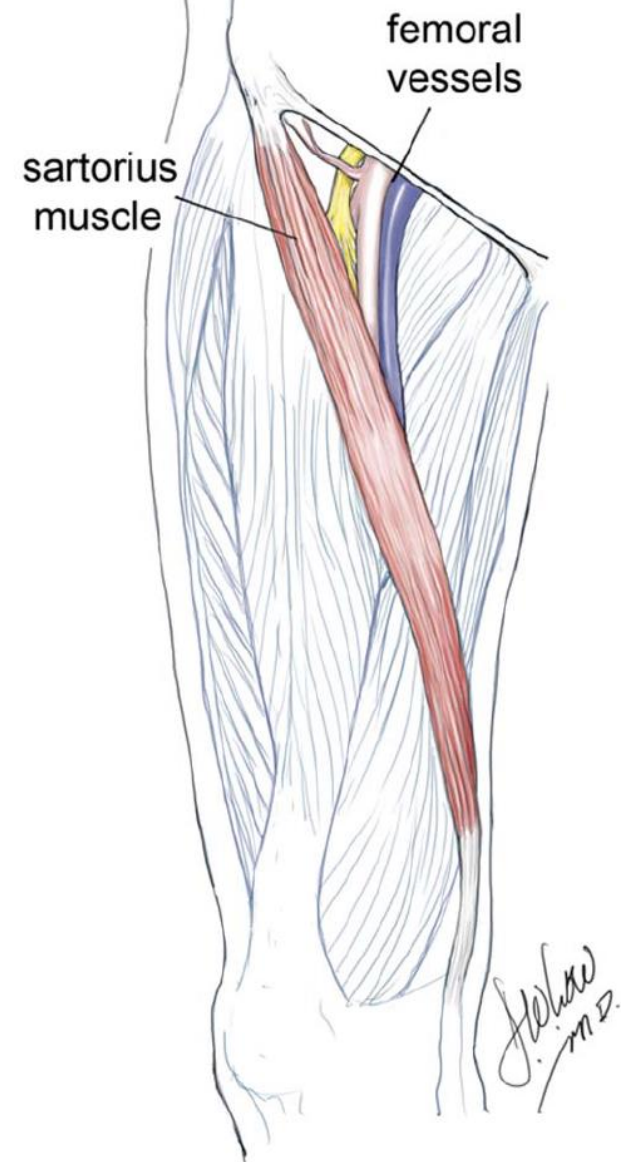
| Type of Graft Infection | Time from Implantation | Microorganisms  |
|-------------------------|------------------------|---|
| Peri-prosthetic         | Early                  | Staphylococcus aureus<br>Streptococcus<br>Escherichia coli<br>Pseudomonas |
|                         | Late                   | Staphylococcus epidermidis  |
| Entero-paraprosthetic   | Late                   | Escherichia coli<br>Enterococcus<br>Bacteroides                           |
| Aorto-enteric Fistula   | Early                  | Escherichia coli<br>Staphylococcus aureus                                 |
|                         | Late                   | Escherichia coli<br>Klebsiella<br>Staphylococcus epidermidis              |

# Sartorius Flap

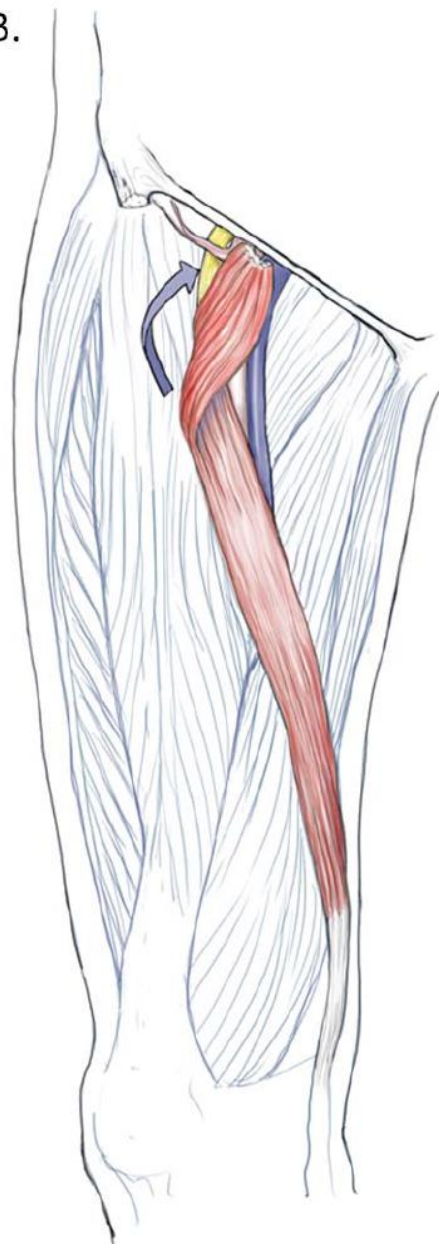
- First described in 1948 to cover exposed femoral vessels after inguinal lymph node dissection.
- Sartorius muscle remains the best possible option to provide a rotational muscle flap in the groin;
  - Readily available.
  - Technically easy mobilisation.
  - Does not result in any functional impairment.
- Other muscles can be used including gracilis, rectus femoris and rectus abdominis muscles. However, their mobilization requires more dissection and prolongs surgical time



A.



B.



East Lancashire Hospitals **NHS**  
NHS Trust

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# 1 – Pre-operative – Wound management bag



## 2 – Pre-operative status – Macerated skin

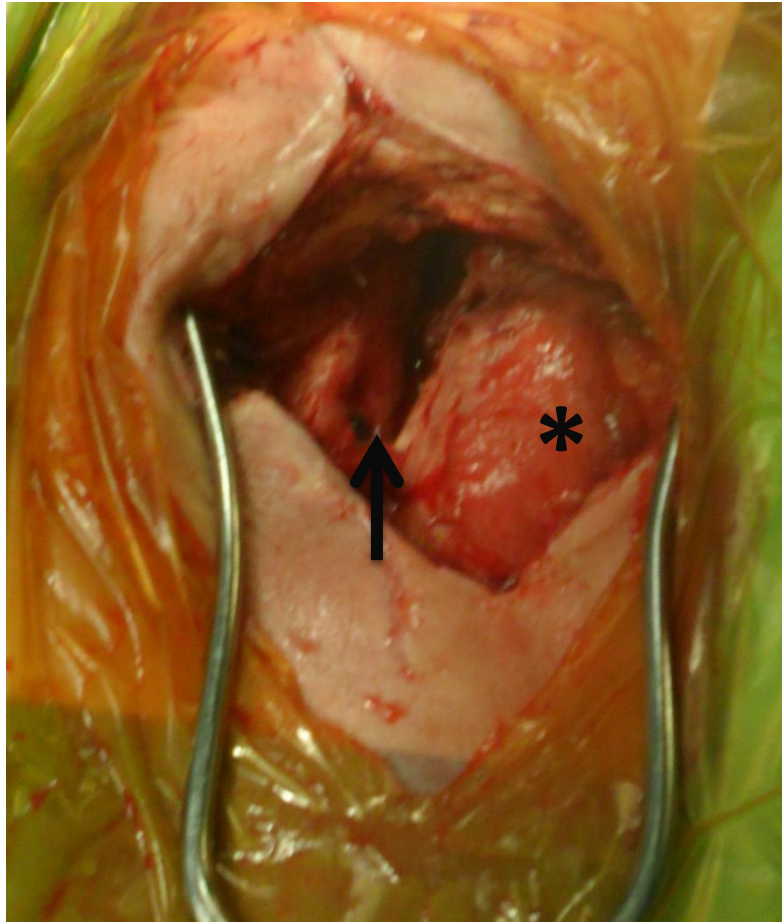




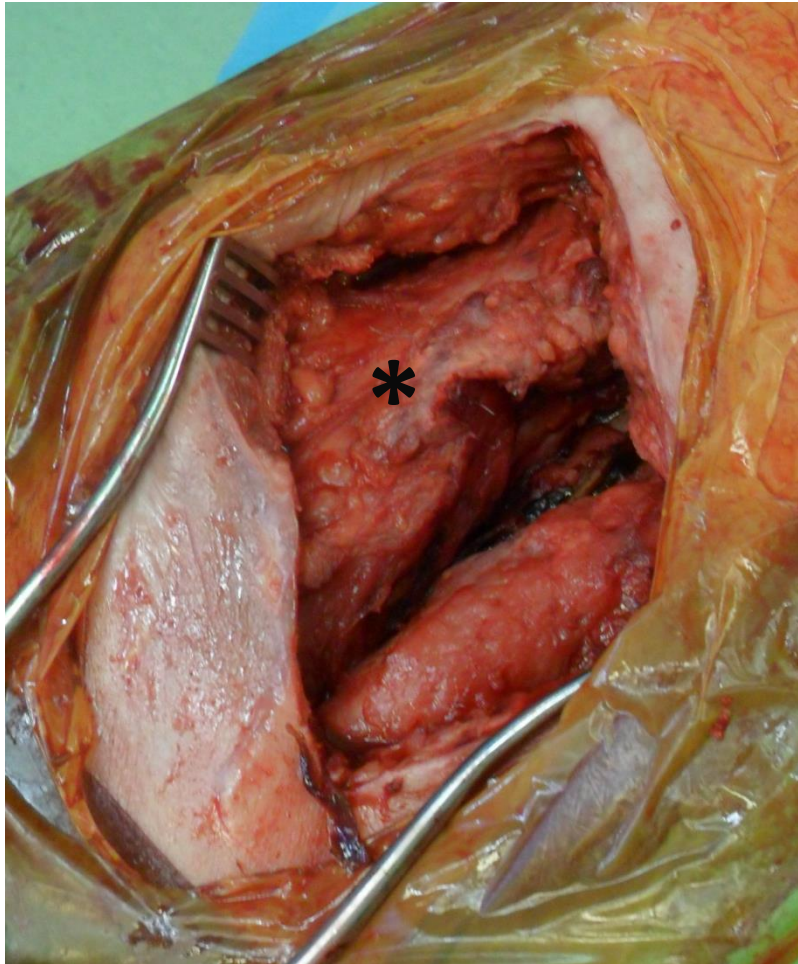
## 3 – Skin incision opened



## 4 – Seroma capsule and prosthetic patch deeper

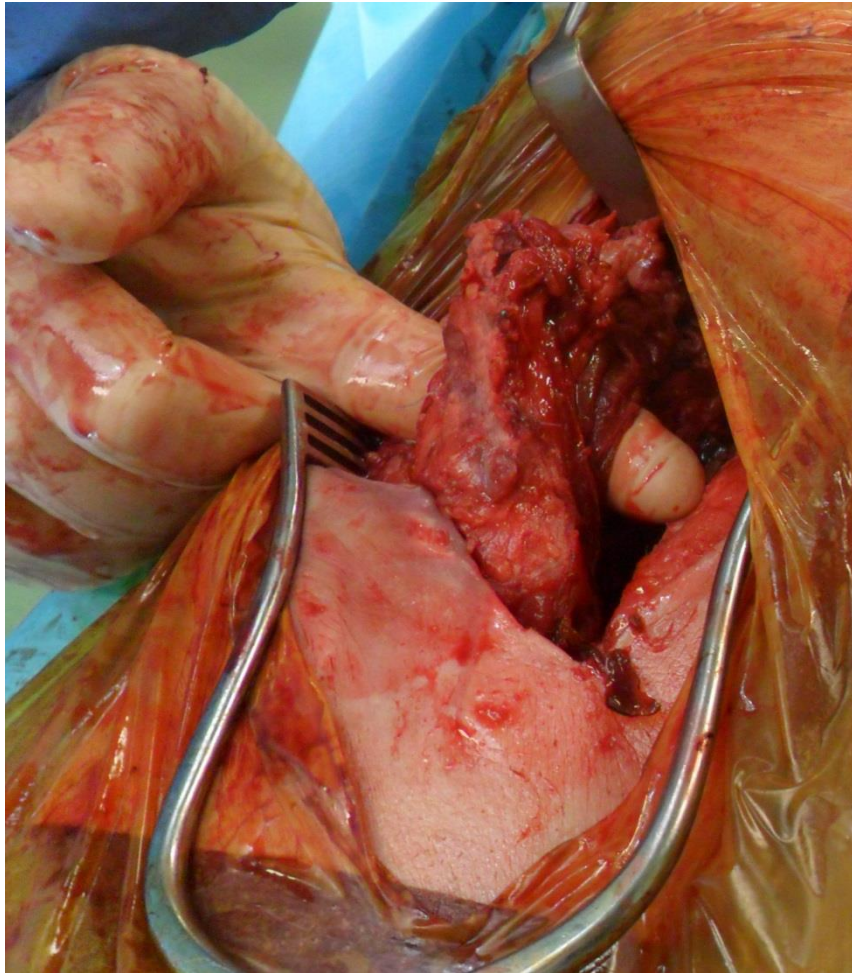


## 5 – Exposing superficial sartorius fascia

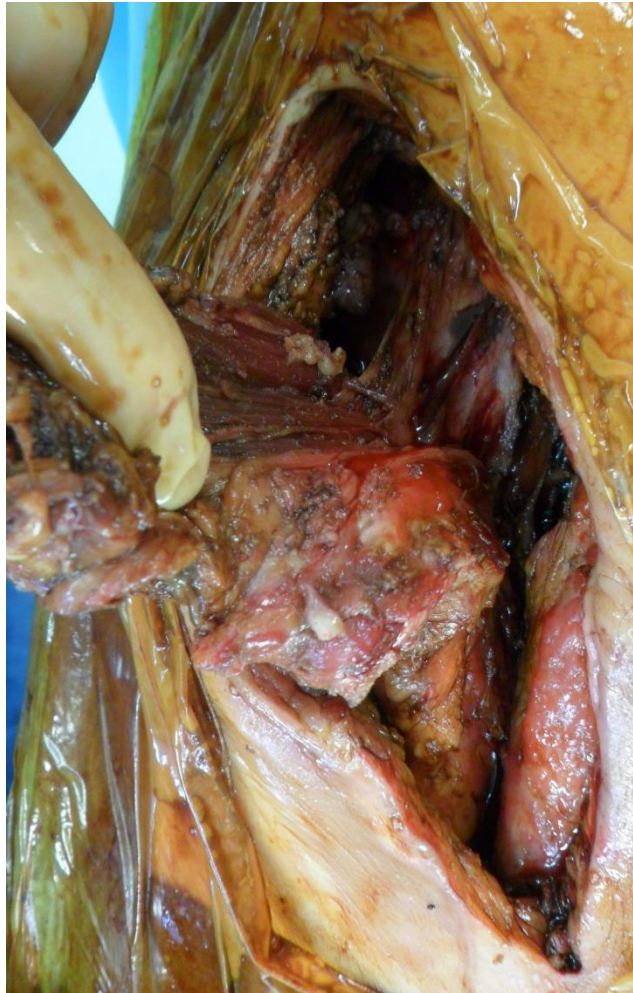




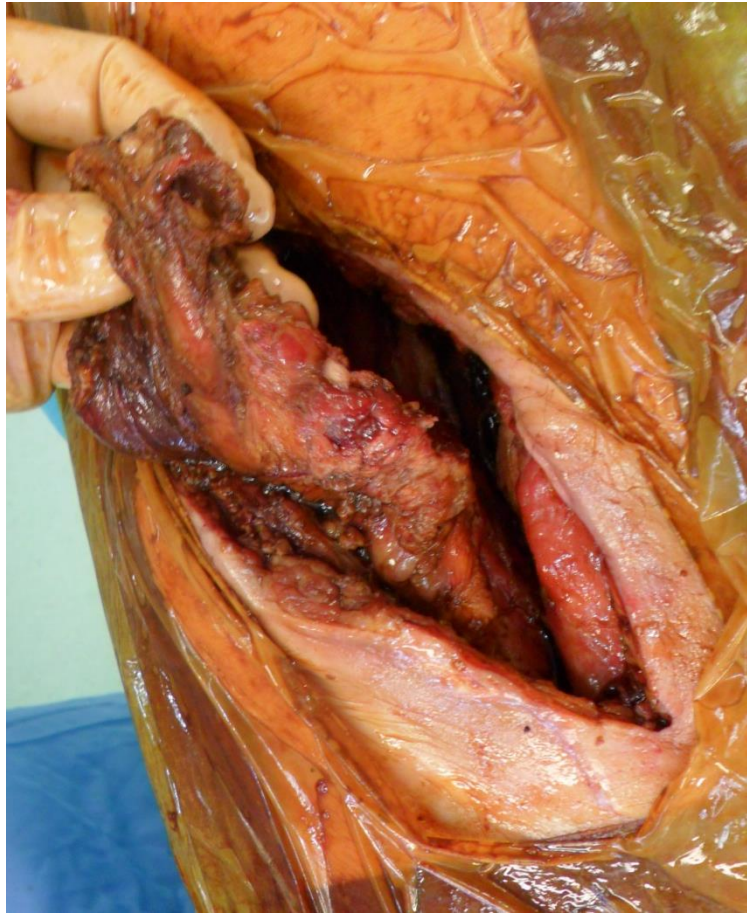
## 6 – Sartorius mobilisation



## 7 – Sartorius taken off ASIS

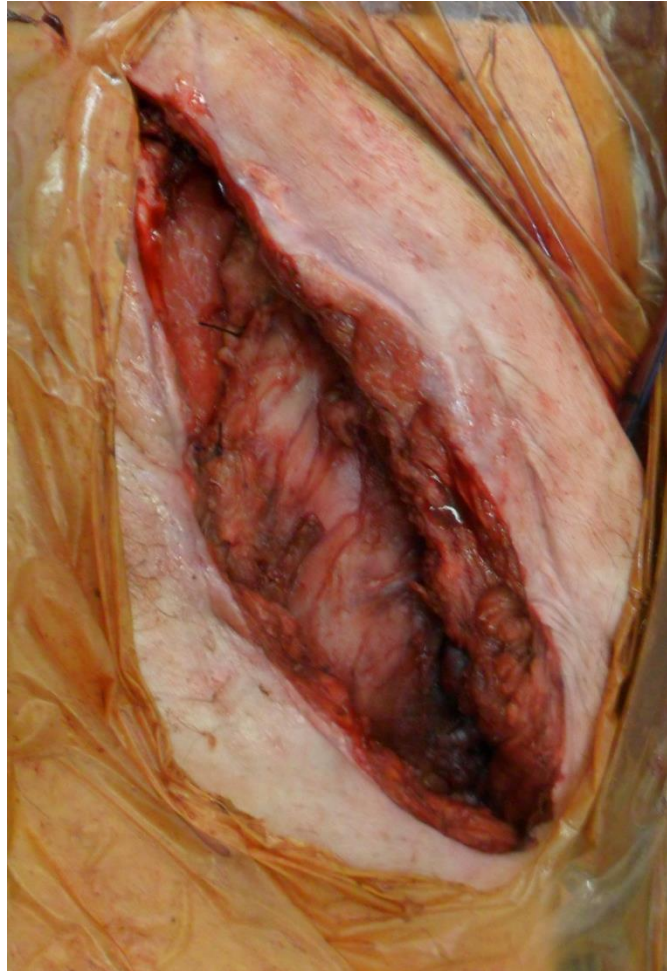


## 8 – Flap inspected for rotational coverage

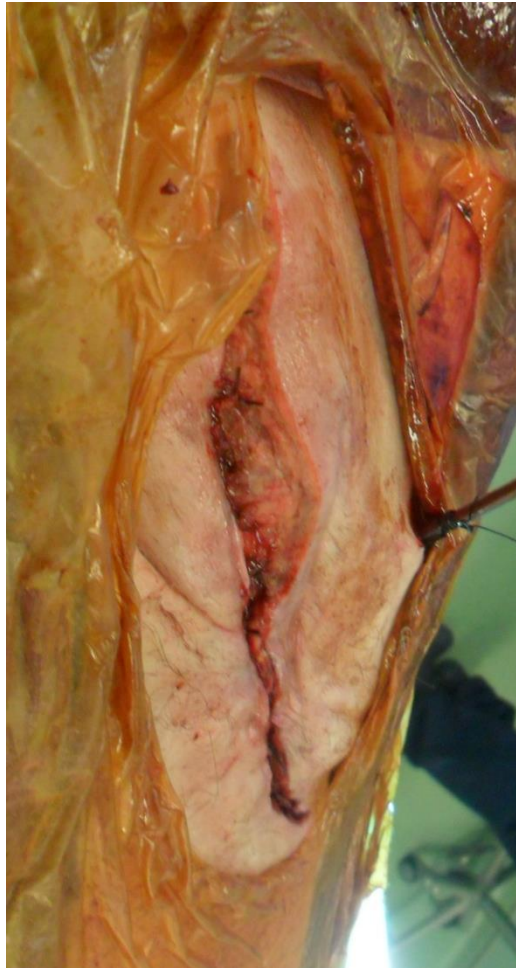




## 9 – Sartorius sutured in place over vessels



## 10 – Subcutaneous tissue closure & drain insertion

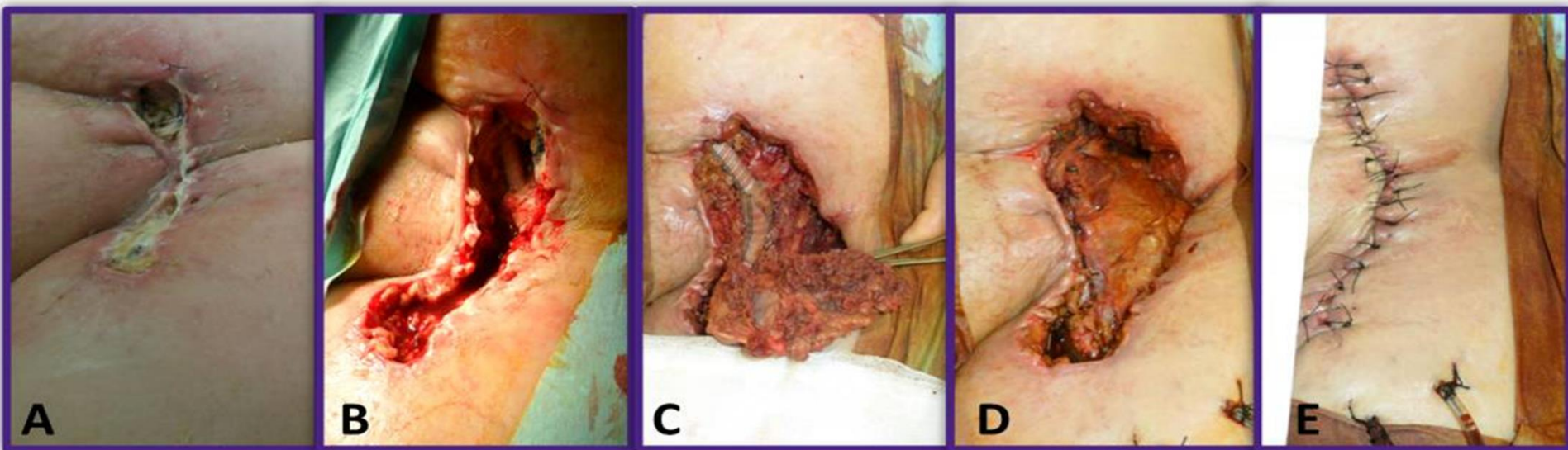




# 11 – Skin closure



## Further Case



## Sartorius Flap Adjuncts – In-patient

- Immediate broad spectrum antibiotics.
- Whole body vein scan for conduits.
- Early theatre intervention.
- Removal of all foreign graft material if possible.
- Copious intra-operative betadine lavage.
- Collatamp packing.
- Careful skin closure;
  - Multilayer vicryl closure for subcutaneous tissue.
  - Interrupted non-absorbable simple mattress for skin.



## Sartorius Flap Adjuncts – Discharge planning

- PICC Insertion and antibiotic regimen finalisation – usually three months.
- Patient education – immediate return for assessment if any wound concerns.
- Regular evaluation by vascular nursing staff in first two-weeks post-discharge.
- Regular vascular consultant review.



## Cumbria and Lancashire Vascular Centre Experience

- Four patients had sartorius flaps created from October 2015 to September 2016.
- Male =3, mean age = 67 years.



## Cumbria and Lancashire Vascular Centre Experience

- All emergencies.
  - Male, 70 claudicant – CFA bovine pericardial patch blow out 2am. Emergency transfer to theatre with patch excision and redo-vein patch angioplasty. Discharged 3 weeks later and completed 3 months IV antibiotics. Well 12 months later.



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  - Female, 57 acute-chronic ischaemia – Fem-Fem and left Fem-Pop bypass – no vein available. All Dacron. Chronic wound left groin. Explored and all grafts not integrating. Not amenable for excision. Sartorius flap performed and partially successful but required further skin graft by plastic surgery performed. Review at 6-months – wound 75% closed and no graft visible.

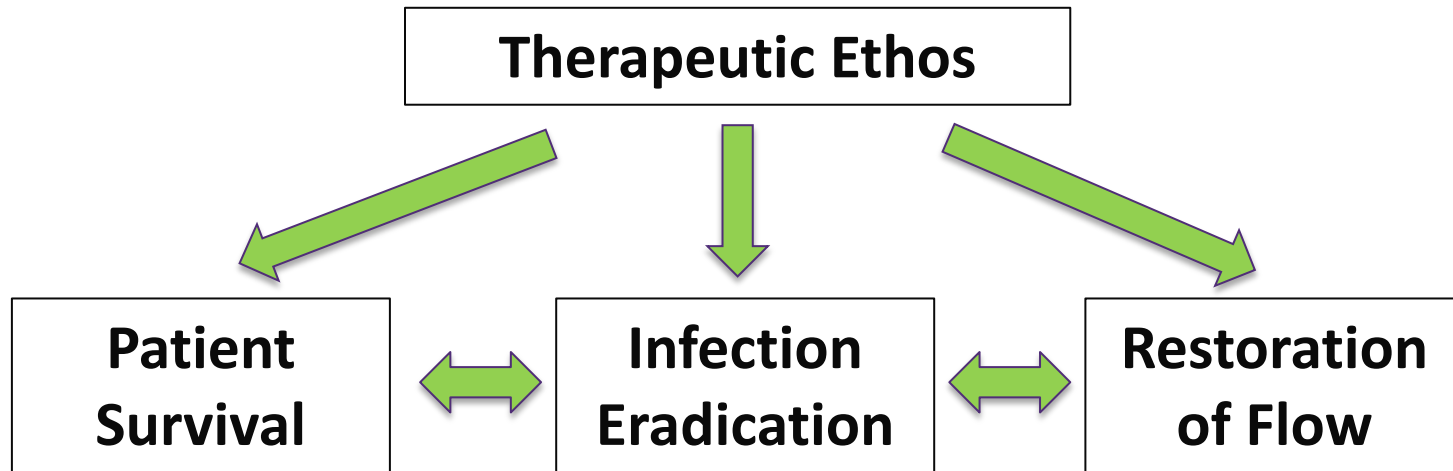


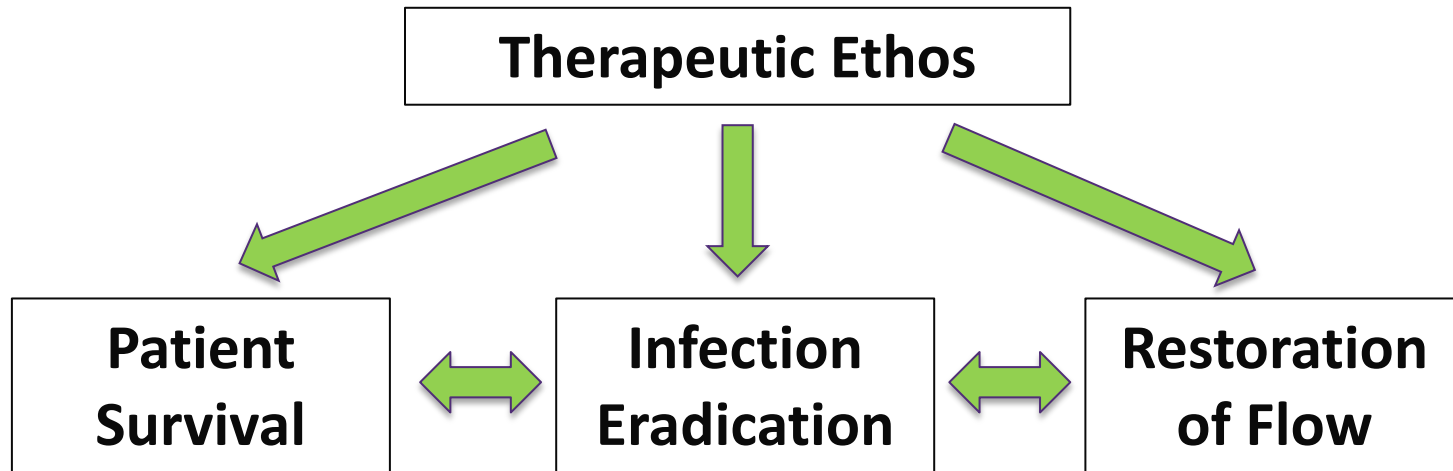


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  - Male, 79 claudicant – ABF in 1991 followed by poor outflow right side and concerns for ABG. Right CFA endarterectomy and bovine pericardial patch. Discharging large wound for 6 weeks in community. Admitted with generalised malaise and deep groin wound. Sartorius flap and grafts left in situ. Commenced on antibiotics and remains an in-patient at day 14.







**Durable  
+  
Minimise  
Re-infection**





# The Successful Treatment of a Proximal Type I Endoleak using the HeliFX EndoAnchor System – A Useful adjunct in EVAR Re-intervention.

Johnathan Porter  
ST3 Vascular Surgery Specialty Registrar,  
North West Deanery

19<sup>th</sup> September 2016

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# Endoleaks

- EVAR widely accepted as an effective, safe and minimally invasive treatment for infra-renal AAA.
- This technique has several limitations and complications.
- Endoleaks are most common reasons for re-intervention after EVAR.
- Type 1 endoleaks are associated with AAA rupture and require prompt treatment.



# Type 1A Endoleak - Treatment Strategies

- Moulding balloon dilatation
- Aortic extension cuff
- Large calibre balloon-expandable stents
- Glue / Coils



# APTUS™

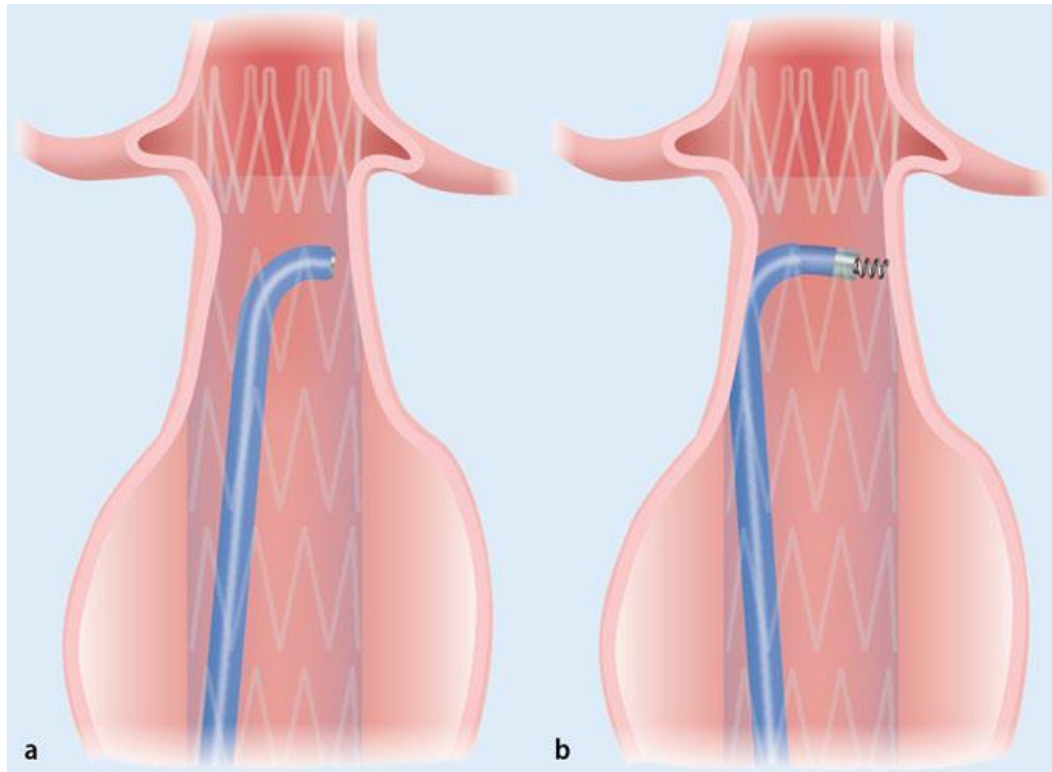
Endo Anchor System



EndoAnchor™



# The HeliFX EndoAnchor System





# The HeliFX EndoAnchor System - Video



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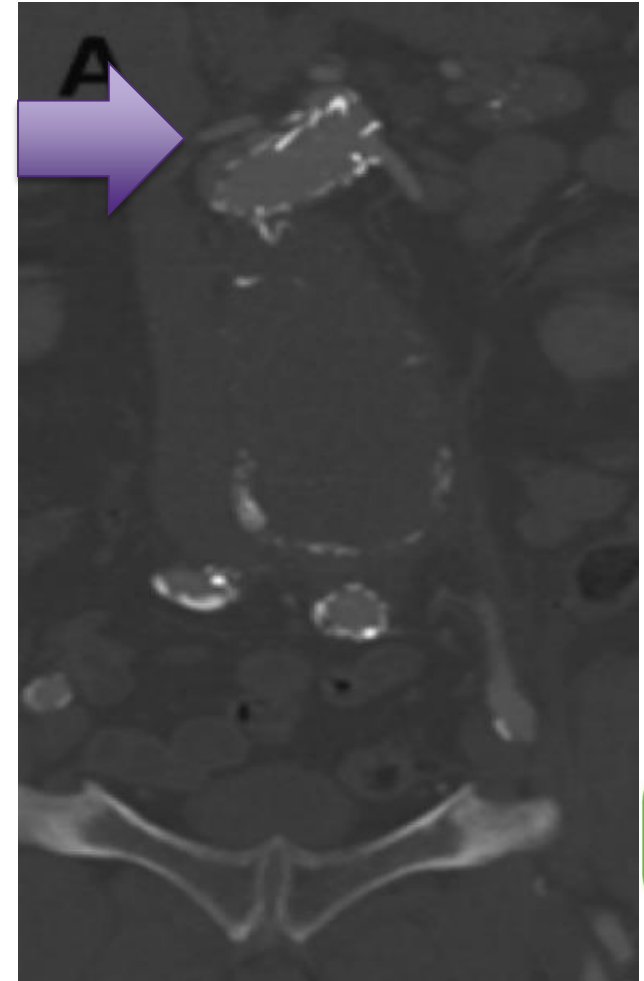
# Case Report

- Initial procedure
- Post-operative CT
- Endovascular procedural details
- Follow-up CT



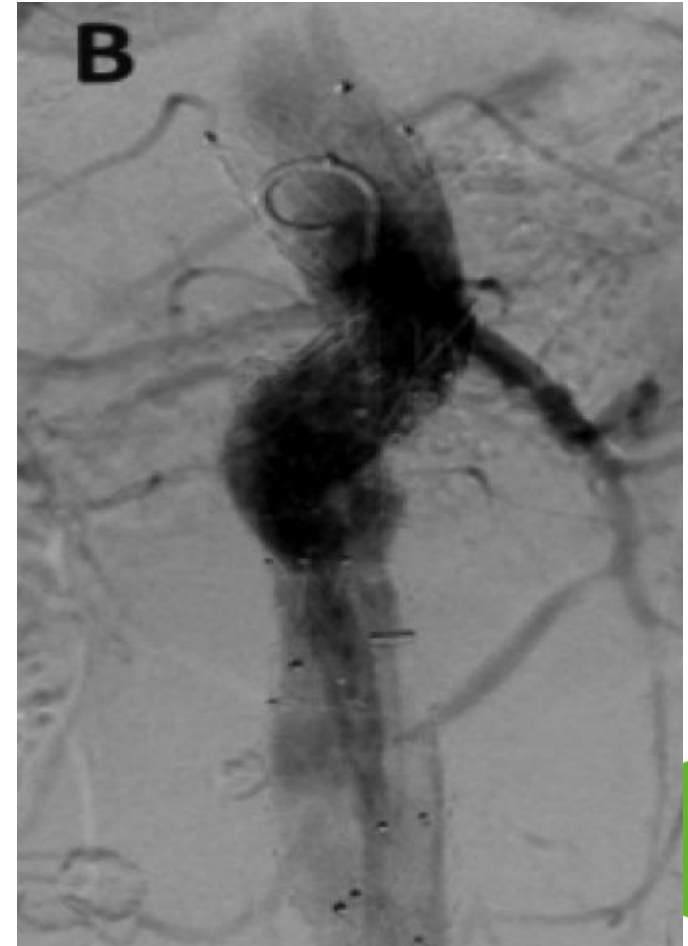
## Case report

- 84-year-old male presented with an incidental 6.8cm infra-renal AAA, after investigation for acute lower limb ischaemia.
- He proceeded to EVAR.
- One-month post-EVAR CT angiogram identified a posterior type-1 endoleak.



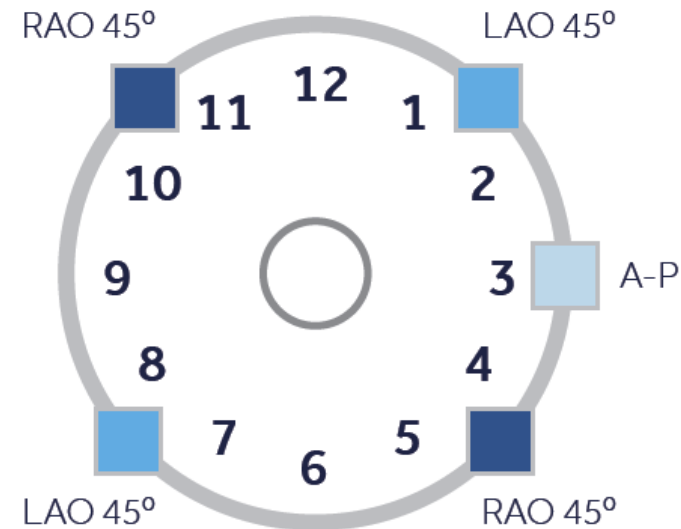
# Endovascular Procedure

- The patient proceeded to redo-endo-intervention
- Intra-operative angiogram confirmed the alteration in proximal neck anatomy.
- However, the type 1 endoleak was difficult to identify.
- Decision was made to proceed to endovascular repair of the type-1 endoleak.



# Endovascular Procedure

- An 18F sheath facilitated proximal neck moulding with a Reliant balloon.
- We then inserted circumferential Aptus endoanchors (n=8).

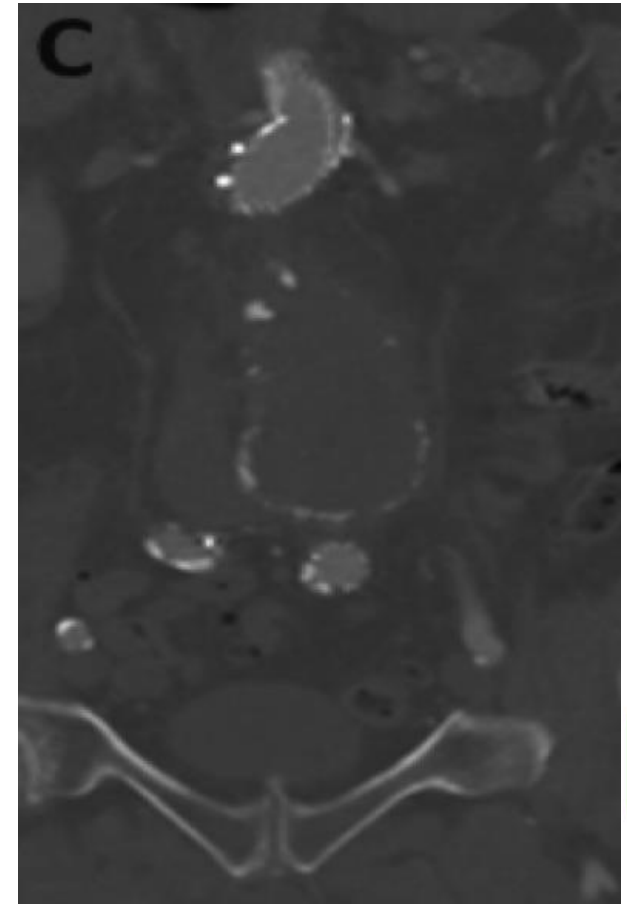


**FIG 7**  
Planning of clock position fixation of endoanchors.



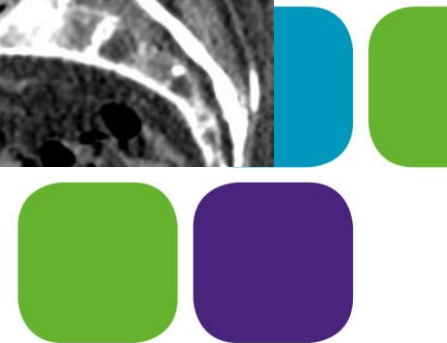
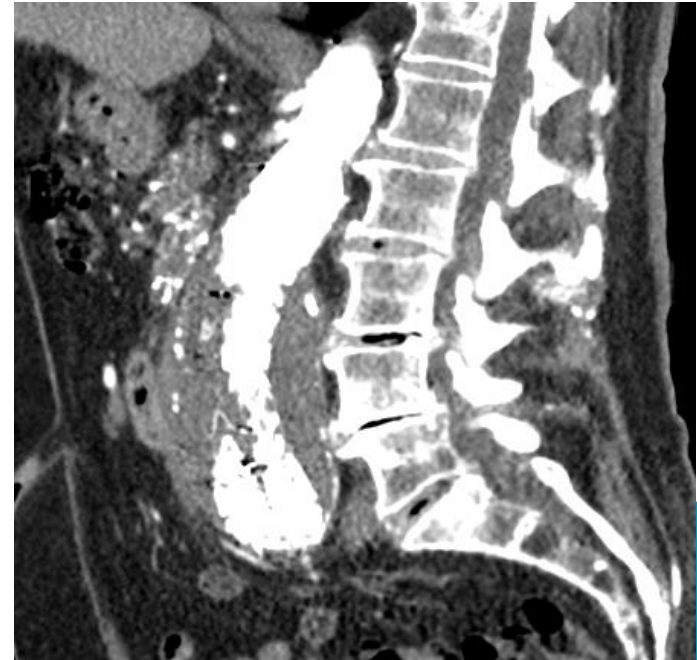
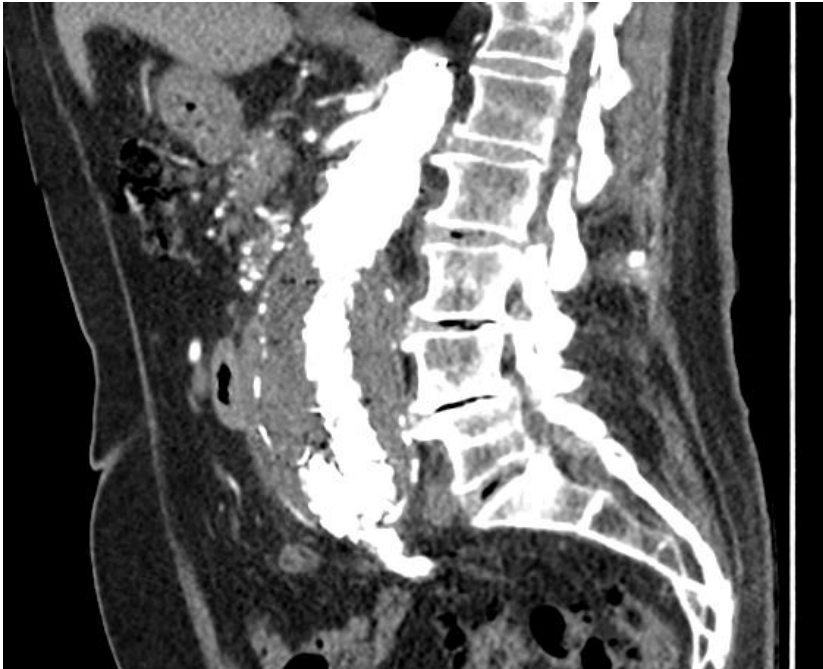
# Endovascular Procedure

- For reassurance the proximal neck was further scaffolded with size 32mm x 80mm uncovered stent (Optimed sinus XL).
- The patient was discharged the following day.
- One month surveillance CT scan showed no evidence of endoleak.



# Endovascular Procedure

- Six month surveillance CT scan also showed no evidence of endoleak.



# Global Experience

- ANCHOR trial – Journal of Vascular Surgery
- 2014 (Jordan et al)
  - 319 patients (242 primary, 77 revision)
  - 23-month study
- Aneurysms averaged  $58 \pm 13$  (51-63) mm
- The proximal aortic neck averaged  $16 \pm 13$  (7-23) mm in length (42.7% <10 mm and 42.7% conical) and  $27 \pm 4$  mm (25-30 mm) in diameter;
- Infrarenal neck angulation was  $24 \pm 15$  (13-34) degrees.





# Global Experience

- ANCHOR trial – Journal of Vascular Surgery
- 2014
  - Technical success 95%
  - Procedural success in 279 patients (87.5%),
  - Primary arm: 217 of 240 (89.7%)
  - Revision arm: 62 of 77 (80.5%)
- During mean follow-up of  $9.3 \pm 4.7$  months, 301 patients (94.4%) were free from secondary procedures.
- No open surgical conversions & no aneurysm-related deaths or ruptures during follow-up.



- 2014
  - Use of EndoAnchors to treat existing and acute type Ia endoleaks and endograft migration was successful in most cases.
  - Prophylactic use of EndoAnchors in patients with hostile aortic neck anatomy appears promising, but definitive conclusions must await longer term follow-up data.



# Global Experience

- ANCHOR trial – Vascular
- 2016 (Jordan et al)
  - 100 patients with one-year follow-up in the ANCHOR study.
  - Primary cohort (N = 73) EndoAnchors used for initial EVAR.
  - Revision cohort (N = 27) patients treated remote from EVAR.
  - Hostile neck defined as: neck length <10 mm, neck diameter >28 mm, angulation >60°, conical configuration or significant mural thrombus or calcium.



- 2016
  - Baseline anatomy included neck length of  $17 \pm 14$  mm, diameter of  $27 \pm 5$  mm, and angulation of  $35 \pm 18^\circ$ ;
  - 83% of patients had hostile necks.
  - Over  $18 \pm 4$  months of clinical follow-up, six patients (6%) underwent aneurysm-related re-interventions.
  - There were no aneurysm ruptures.
  - Over  $13 \pm 2$  months of imaging follow-up, freedom from type Ia endoleak was
    - 95% in the Primary Arm and
    - 77% in the Revision Arm



- 2016
  - Despite a high frequency of hostile neck anatomy, proximal neck complications were relatively infrequent after EndoAnchor use.



# Conclusion

- Additional strategy for treating Type 1a endoleaks.
- Potential to allow EVAR in patients with hostile / unfavourable anatomy.
- ? Future changes in stent graft IFU – Endurant & Endoanchors (Medtronic).



# Questions?

