CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES IN VASCULAR SURGERY
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Management of PTFE Seromas

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Disclosure

Speaker name: Larry A. Scher, MD

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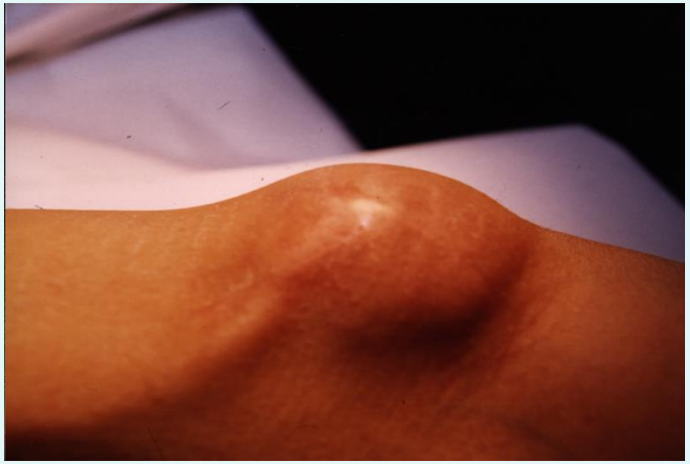
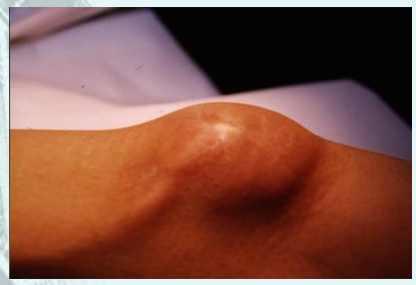
- ☐ I have the following potential conflicts of interest to report:
- ☐ Consulting
- ☐ Employment in industry
- ☐ Shareholder in a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)
- ☒ I do not have any potential conflict of interest

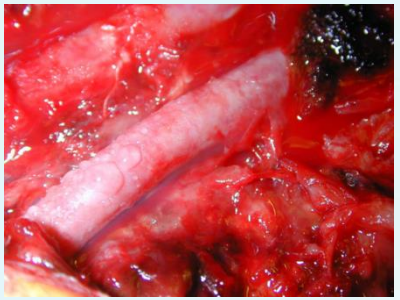
Perigraft seroma formation is related to the synergism of biochemical, mechanical and structural factors



Postoperative perigraft seroma



vs

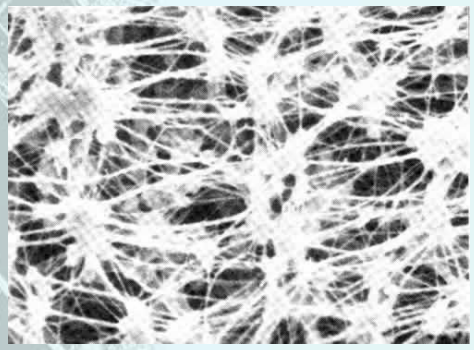


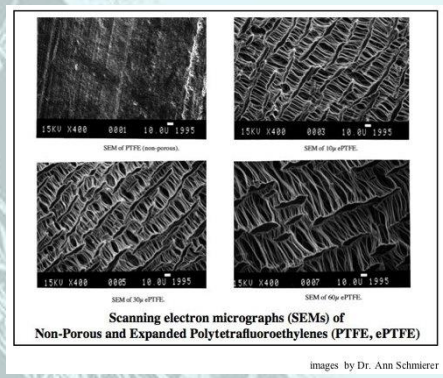
immediate ultrafiltration

('beads of fluid' vs 'opening a faucet')

Etiology of PTFE graft seromas

- Excess graft porosity (? manufacturing error)
- Exposure of graft to caustic agents
  - Alcohol
  - Povidine iodine
- Immunologic or allergic factors
- Biochemical factors – inhibition of fibroblast growth
- ? Diabetes
- ? Heparin exposure
- ? Nonsheathed tunneler





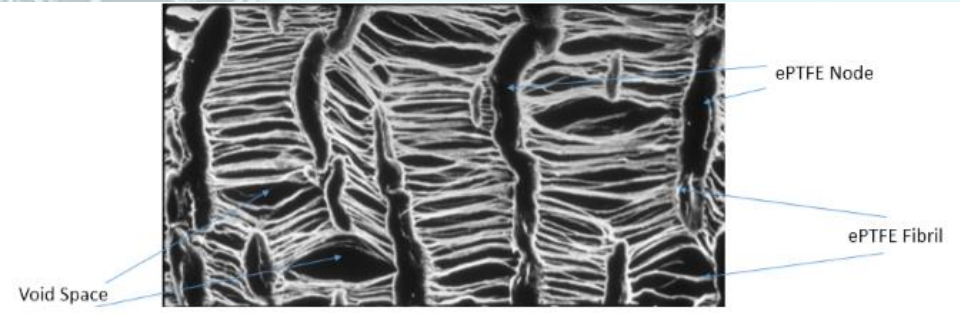
Scanning electron micrographs (SEMs) of
Non-Porous and Expanded Polytetrafluoroethylenes (PTFE, ePTFE)

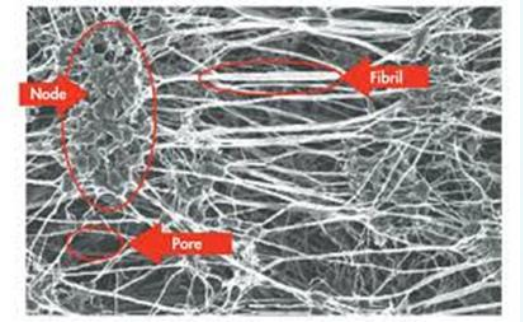
images by Dr. Ann Schmierer

Bob Gore discovered that rapidly stretching PTFE under the right conditions created a very strong, microporous material. The result, known as GORE® expanded PTFE (ePTFE), exhibits an amazing array of properties

ePTFE Microstructure and Ultrafiltration

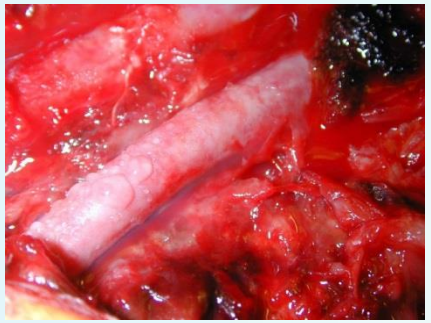
- Nodes and fibrils with void spaces filled with air (80%)
- When the air in the void space is displaced rapidly all ePTFE grafts will persistently leak fluid
- Ideally graft implanted and over 24-48 hours air slowly displaced by body's fluid and fibroblasts migrate into interstices and deposit collagen
- Pore size same on all ePTFE





Possible causes of immediate ultrafiltration through vascular graft

- Premature wetting of the graft with fat or organic solvents
  - Graft rubbed with fat from dog will leak continuously
- Excessive manipulation of the graft with blood
- Forcing irrigating solutions though the graft wall
- Antibiotic irrigation of the graft
- Genetic trait of the patient
- Low blood viscosity
- Anticoagulation
- 41% increase in leakage through “bent” or kinked segments of grafts has been seen

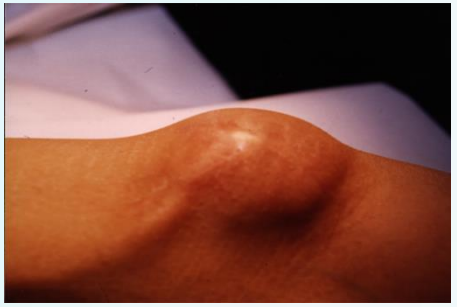


Graft "Wetting"

- Hydrophobic PTFE graft surface becomes hydrophilic when in contact with blood or body fluid
- Graft seals by deposition of proteins and fibrous tissue attachment externally and neointimal formation internally
- "Wetting" hinders process of graft sealing
- Affected by hemodynamic factors (flow rate > 1 L/min), blood pressure, hematocrit, oncotic pressure, alcohol or povidine-iodine contact of graft, excess graft manipulation with instruments
- No consistent relationship between heparin administration and seroma formation

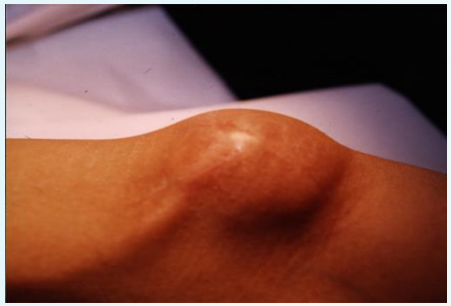
Potential complications of untreated seromas

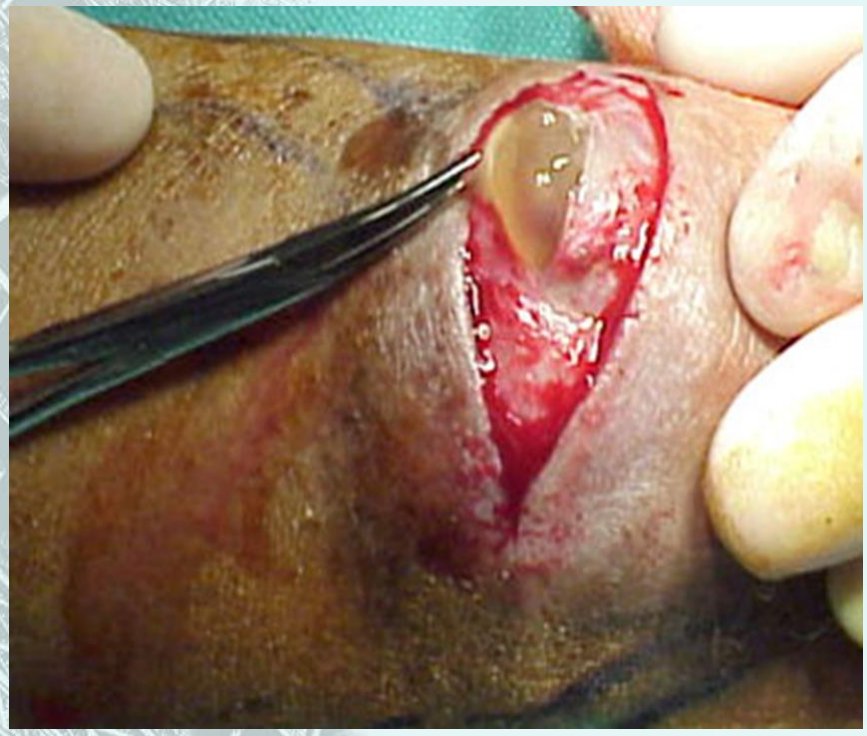
- Wound infection
- Wound dehiscence
- Skin necrosis
- Graft thrombosis
- Loss of available cannulation sites

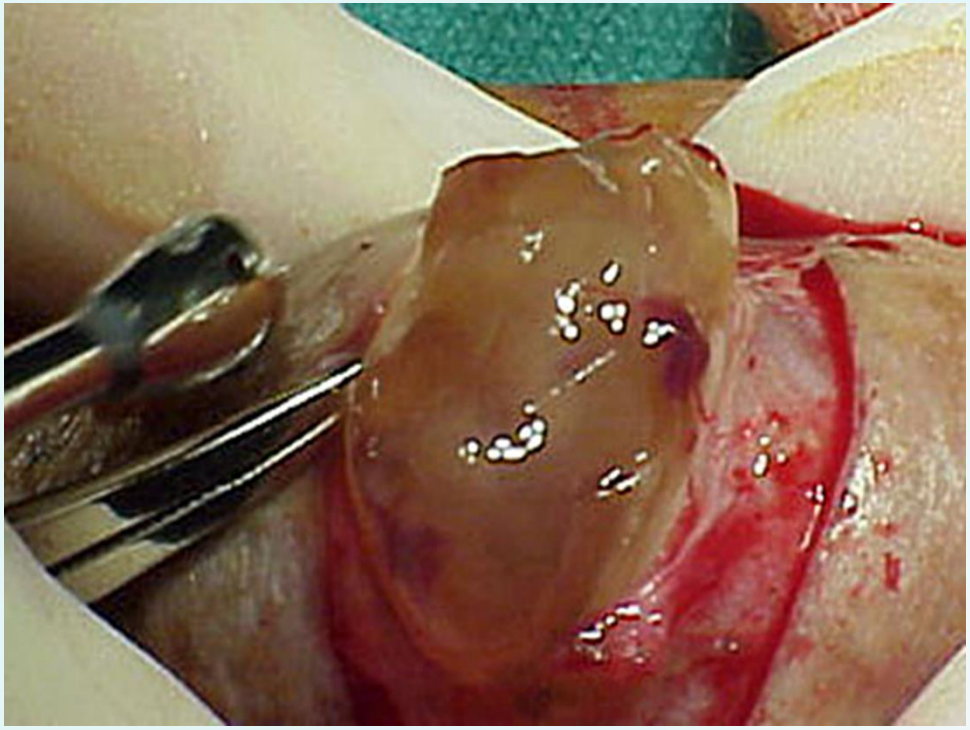


Management options for hemodialysis PTFE graft seromas

- Observation
- Percutaneous drainage
- Surgical evacuation
- Graft removal or replacement
- Topical sealant or microfibrillar collagen
- Covered stent







Recommended standards for reports dealing with arteriovenous hemodialysis accesses

Anton N. Sidawy, MD, Richard Gray, MD, Anatole Besarab, MD, Mitchell Henry, MD, Enrico Ascher, MD, Michael Silva, Jr, MD, Arnold Miller, MD, Larry Scher, MD, Scott Trerotola, MD, Roger T. Gregory, MD, Robert B. Rutherford, MD, and **K. Craig Kent, MD,** *Washington, DC*

Table VI. Grading severity of arteriovenous-access complications

Complication	*Severity*
Local access complications	
Bleeding Early, postoperative Prolonged bleeding from needle puncture sites	0, None 1, Resolves without treatment 2, Medical therapy needed to correct coagulation abnormality 3, Intervention needed
Infection Early (<30 days)/late (>30 days) Culture: positive/negative Site of infection: anastomosis/mid-AV access/runoff vein	0, None 1, Resolved with antibiotic treatment 2, Loss of AV access because of ligation, removal, and possible bypass 3, Loss of limb
Noninfectious fluid collections Hematoma Seroma Lymphocoele	0, None 1, Observed, resolved 2, Aspirated, surgical drainage 3, Loss of AV access

Management of dialysis access graft seromas

SVS Clinical Practice Guidelines, Padberg et al, J Vasc Surg, 2008

- Incidence 0.48 % to 4.2 % (most near arterial anastomosis)
- Complication of prosthetic access
- Almost never seen with autogenous access or biologic grafts
- No clearly preferable choice of management among
  - Aspiration
  - Closed suction drainage
  - Graft replacement
  - Capsule debridement

Incidence and management of seroma after arteriovenous graft placement

Dauria, et al , Journal of the American College of Surgeons, 2006

- 535 PTFE AV grafts in 427 patients (preattached plastic sheath and tip)
- 10 patients (1.7%) presented with seroma and underwent surgical treatment
- No difference in incidence based on gender, age, diabetes
- No difference upper vs lower extremity
- No difference forearm loop vs straight forearm graft
- Statistically significant difference between upper arm and forearm grafts (p=.0007)

Incidence and management of seroma after arteriovenous graft placement

Dauria, et al, Journal of the American College of Surgeons, 2006

- Surgical intervention in 10 patients at mean of 83 (28-144) days
- Types of surgical intervention
  - Bypass (0 / 5 recurrence)
  - Evacuation (2/4 recurrence)
  - Graft excision
- Recommendation – excise seroma capsule, bypass involved graft segment
- Controversies – new anatomic route?, new graft material?

Management of PTFE graft seroma with covered stent

Gargiulo et al, Journal of Vascular Surgery, 2008

- Two cases (additional 2 cases since report)
- Seroma at arterial end of tapered 4-7 mm PTFE graft
- Successful treatment with 8 x 50 mm Wallgraft
- Retrograde deployment “bareback’ precisely at arterial anastomosis
- Drainage of seroma cavity
- Successful treatment of AV graft pseudoaneurysms with covered stents
- Potential to access through stent for hemodialysis
- Potential use of Viabahn or Fluency covered stents

Use of covered stent for treatment of hemodialysis PTFE graft seromas

Body copy 16pt Calibri

Deployment of Wallgraft precisely at arterial anastomosis

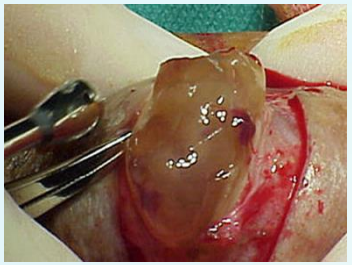
Completion fistulagram demonstrating AV graft patency

Management options for intraoperative serous ultrafiltration through graft wall

- Fibrin glue or topical thrombin to induce 'clotting'
- Wrapping graft in collagen fleece soaked with fibrin glue
- Replace graft at ultrafiltrating site with same or different material
- Replace entire graft with same or different material
- Wait for ultrafiltration to cease – and wait – and wait .....

Management options for postoperative serous ultrafiltration (seroma) through graft wall

- Monitoring without intervention
- Replace graft at ultrafiltrating site with same or different material
- Replace graft with same or different material in new tunnel
- Aspiration of serum or plasma
- Drainage of perigraft fluid
- Pseudocapsule resection
- Fibrin glue or topical thrombin to induce ‘clotting’
- Deployment of covered stent



Alternative Graft Materials

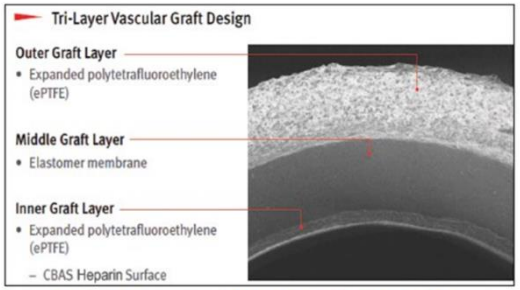
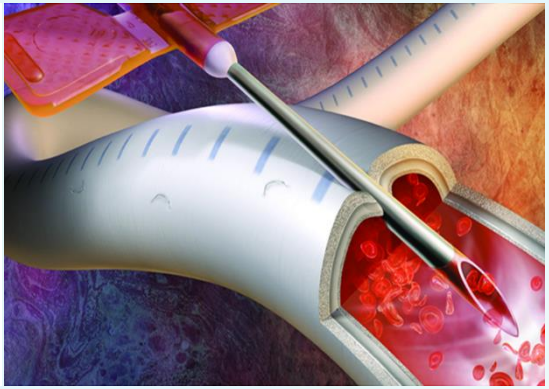
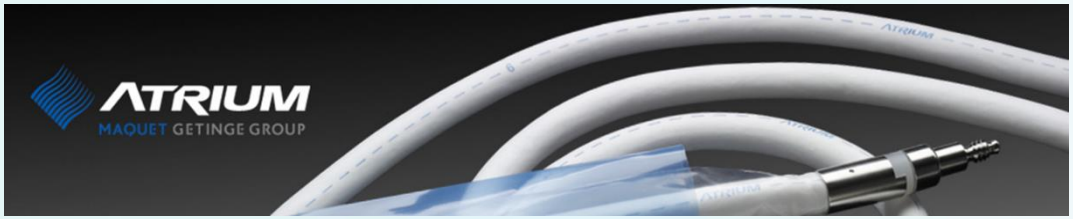


Figure 1. This is a scanning EM of the GORE ACUSEAL Graft demonstrating the three layers of the graft. The middle elastomer layer provides the "low-bleed" state of the graft.



Acuseal



Flixene

Frequency, risk factors, and management of perigraft seroma after open abdominal aortic aneurysm repair

Presented at Thirty-fourth Annual Meeting of the Midwestern Vascular Surgical Society, September 9-11, 2010, Indianapolis, Ind.

Ajith K. Kadakol, MD, Timothy J. Nypaver, MD, Judith C. Lin, MD, Mitchell R. Weaver, MD, Joseph L. Karam, MD, Daniel J. Reddy, MD, Georges K. Haddad, MD, Alexander D. Shepard, MD
Division of Vascular Surgery, Henry Ford Hospital, Detroit, Mich

- 20 / 98 (20.4%) PTFE aortic grafts, 0 / 13 dacron grafts
- Factors associated with development of perigraft seroma
  - Diabetes
  - Smoking
  - Anticoagulation
  - Bifurcated grafts
  - Left retroperitoneal approach

- Treatment required in 4 / 20 patients for expansion or limb ischemia secondary to graft compression
  - Open exploration and graft replacement (3)
  - Thrombolysis and stenting (1)

J Vasc Surg. 2011 54:637-43


Merci Beaucoup