

# Aneurysm Occurring in a Femoral Artery Dacron Prosthesis Five and One-Half Years After Insertion \*

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ANEURYSM as a complication in peripherally implanted homografts occurs not infrequently, and is well documented in the current literature.<sup>1, 2, 6, 10</sup> This phenomenon *per se* as a complication in prosthetic grafts, with the exception of Ivalon (formalized polyvinyl),<sup>4</sup> is most unusual. Structural deficiency has not been indicated as a significant cause of failure in the Dacron or Teflon arterial prostheses enjoying widespread popularity at the present time. Follow up studies to date have recorded infection, false aneurysms at the anastomoses, and advancing degenerative changes in the host vessels<sup>9</sup> as the principal causes of late failure in these prostheses when employed in the treatment of superficial femoral artery occlusive disease.

Since aneurysm of a peripherally implanted prosthesis previously has not been recorded in the literature, it is believed worthwhile to report on our experience with one patient in whom an entire length of a woven Dacron prosthesis became aneurysmal five and one-half years after successful implantation in the thigh for the treatment of superficial femoral artery segmental occlusive disease.

## Case Report

H. L. (S.L.H. 44-18-05), a 55-year-old woman (previously reported),<sup>7</sup> was admitted to St. Luke's Hospital with the complaint of increasing claudication of the left calf for three months prior to admission. Bilateral femoral arteriography, performed with the contrast media injected via a

translumbar aortic needle, revealed a 10 cm. occlusion of the left superficial femoral artery (Fig. 1). A woven Dacron prosthesis was successfully inserted in October 1955 (Fig. 2, 3), re-establishing distal pulses with complete symptomatic relief. Relief of symptoms continued until May 1961, at which time the patient first noticed a painful swelling in the operative area in the thigh. A femoral arteriogram revealed a fusiform aneurysm involving the entire Dacron conduit (Fig. 4). Distal pulses were still palpable, however, and the host vessels as outlined in the arteriogram showed little change when contrasted with the "run-off" demonstrated in the original arteriogram in 1955.

Operative exploration of the graft site revealed a diffuse aneurysmal dilatation of the entire prosthesis (Fig. 5). The aneurysmal graft was removed along with approximately 1.0 cm. of the

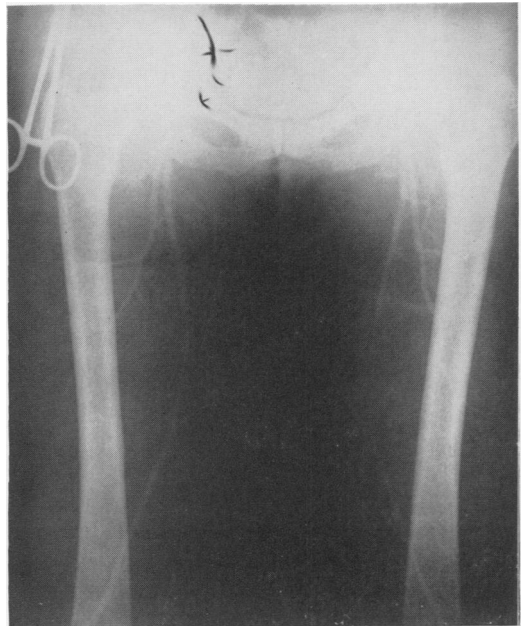


FIG. 1. Bilateral femoral arteriogram revealing segmental occlusion of left superficial femoral artery.<sup>7</sup>

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FIG. 2. Photograph of woven Dacron graft inserted to bridge defect. End-to-end anastomoses were employed.<sup>7</sup>

host vessel at either end, and a crimped knitted Dacron graft was inserted with maintenance of the distal pulses.

Pathologic examination revealed the aneurysmal graft to be lined for its entire length with intima derived from capillary infiltration (Fig. 6 a). There was no evidence of an isolated defect in the graft. It was apparent that there had been complete loss of the conformity of the weave with fragmentation and resultant dilatation of the fi-

brous capsule enveloping the original graft. Microscopic examination of several cross sections through portions of the aneurysm revealed foam cells and early atheromatous infiltration beneath the intimal



FIG. 3. Bilateral arteriogram 2 months following insertion of Dacron graft.



FIG. 4. Femoral arteriogram performed 5½ years after insertion of graft. Note diffuse aneurysmal change involving entire length of graft.

FIG. 5. Operative photograph illustrating aneurysmal graft dissected free from the thigh musculature.

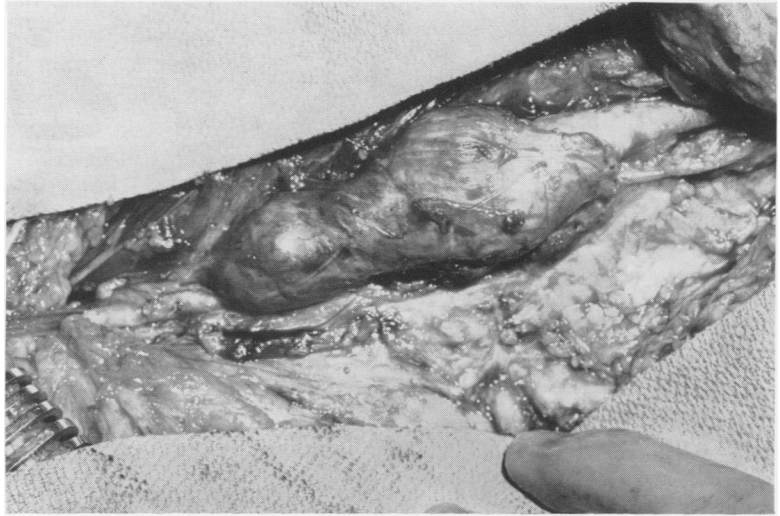
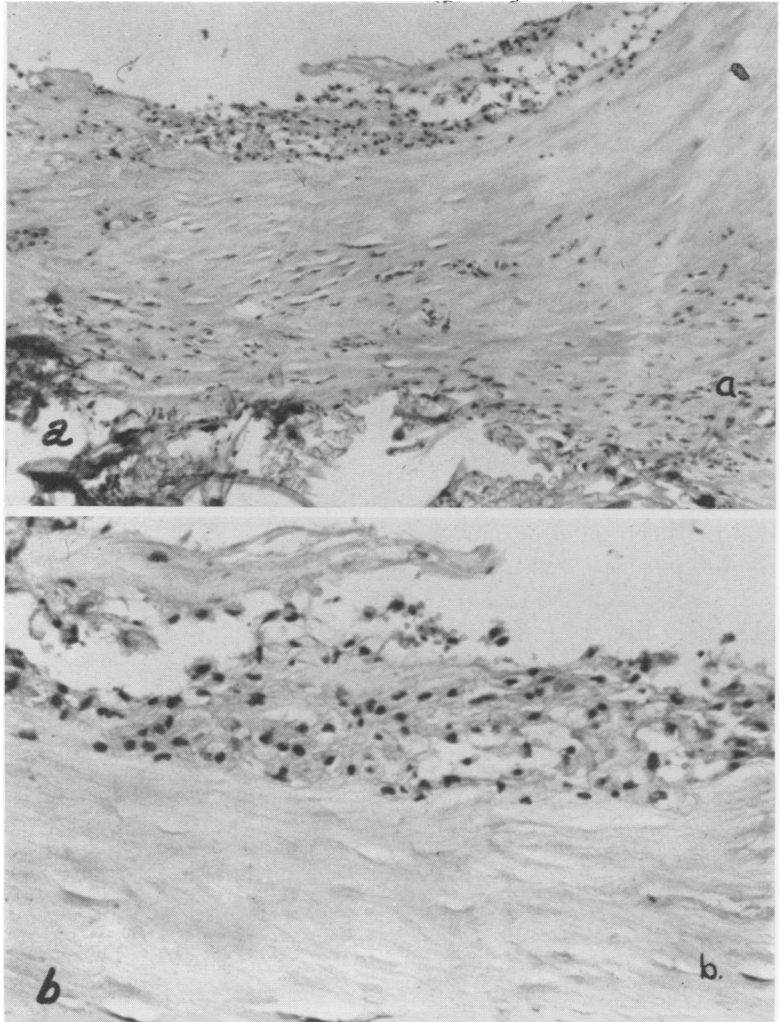


FIG. 6. a, Photomicrograph of cross section of aneurysmal graft. Note intimal layer, Dacron fibers, and perigraft fibroplasia. b, High power photomicrograph illustrating subintimal foam cells containing lipid material, indicating evidence of early atheromatous change in the intimal layer lining graft.



lining (Fig. 6 b). No sclerotic plaques or calcific deposits were noted in any of the serial sections however.

### Discussion

To date, most authorities have not noted fragmentation or degeneration of Dacron or Teflon arterial prostheses. In fact, many observers have attested that durability and minimal tissue reaction is a prime attribute of these particular plastics. However, follow up appraisal in most reported series in which Dacron or Teflon grafts were employed subtends a period of less than five years. Morris *et al.*<sup>8</sup> have expressed confidence that the knitted Dacron grafts, with which they have had a very extensive experience, will produce excellent long-term results. Edwards and Lyons,<sup>3</sup> reporting on a three-year experience with crimped Nylon and Teflon prostheses in humans, did not record a single instance of structural failure. This optimistic note has also been authenticated by Wagner and his colleagues<sup>11</sup> in a histologic study of aortic Teflon grafts observed in normal dogs over a five-year period. Foster and his co-workers,<sup>5</sup> although observing atherosclerotic deposits in three of 11 Nylon prostheses implanted in dogs, did not note any aneurysmal dilatation in these grafts when observed over a three- to five-year period. Structural deficiency in prosthetic grafts had not been noted in our experience until the present case was treated.<sup>6</sup>

It should be noted that the prosthesis employed in the above-described patient was constructed of a woven-taffeta, calendered Dacron of a relatively low porosity, with 250 microns being the average area of open interspace. The porosity and tensile strength of the cloth would compare similarly with the woven prostheses presently employed by most vascular surgeons. Knitted material, in widespread use at present, may have less tendency to fragment or separate.

This case report should serve to emphasize that structural deficiency as a cause

of failure may become a significant problem in prosthetic grafts as long-term follow up becomes available. The reservations many have raised that the ideal arterial substitute has yet to be discovered are still very plausible.

### References

1. Crawford, E. S., M. E. DeBakey, G. C. Morris, Jr. and E. Garrett: Evaluation of Late Failures after Reconstructive Operations for Occlusive Lesions of the Aorta and Iliac, Femoral, and Popliteal Arteries. *Surgery*, 47:79, 1960.
2. DeWeese, F. A., W. D. Woods and W. A. Dale: Failures of Homografts as Arterial Replacements. *Surgery*, 46:565, 1959.
3. Edwards, W. S. and C. Lyons: Three Years' Experience with Peripheral Arterial Grafts of Crimped Nylon and Teflon. *Surg., Gynec. & Obst.*, 107:62, 1958.
4. Fitch, E. A., F. R. Denman and G. W. Waldron: The Obituary of Ivalon Arterial Grafts. *Arch. Surg.*, 81:824, 1960.
5. Foster, J. H., C. Ekman and H. W. Scott, Jr.: Late Behavior of Vascular Substitutes: Three to Five Year Follow Up of Arterial Homografts and Synthetic Prostheses in Experimental Animals. *Ann. Surg.*, 151:867, 1960.
6. Knox, W. G.: A Comparative Evaluation of Prosthetic and Homologous Artery Grafts Used in the Treatment of Occlusive Disease of the Superficial Femoral Artery. *Amer. J. Surg.*, 102:507, 1961.
7. Knox, G. and J. P. West: Dacron Grafts in the Treatment of Arteriosclerotic Occlusion of the Superficial Femoral Artery. Report of Seven Cases. *Ann. Surg.*, 145:59, 1957.
8. Morris, G. C., D. A. Cooley, M. E. DeBakey and E. S. Crawford: Coarctation of the Aorta with Particular Emphasis upon Improved Technique of Surgical Repair. *J. Thor. Cardio. Surg.*, 40:705, 1960.
9. Roberts, B. and W. H. Hardesty: Results Following Femoral and Popliteal Arterial Reconstruction. *Ann. Surg.*, 154:68, 1961.
10. Szilagyi, D. E., R. T. McDonald, R. F. Smith and J. G. Whitcomb: Biologic Fate of Human Arterial Homografts. *Arch. Surg.*, 75:506, 1957.
11. Wagner, B. M., K. E. Evans, K. J. May, Jr., M. S. Ofstun and K. A. Merendino: Histological Observations of Aortic Teflon Grafts in Normal Dogs after Five Years. *J. Surg. Research*, 1:53, 1961.