

## DeBakey double velour dacron fabric: a nonslip, nonreactive, nasal implant

Irwin E. Gaynon, Milwaukee (Wisc.), U.S.A.

### SUMMARY

1. *A brief resume of the problems and the use of dacron velour in vascular grafting is presented.*
2. *Subcutaneous implantation of dacron velour in a canine animal resulted in marked proliferation of connective tissue and blood vessels into the graft.*
3. *Double DeBakey dacron velour is presented for the treatment of roof repair, intraseptal implants, and atrophic rhinitis.*
4. *The velour implant is nonallergenic and does not slip.*

IN the field of nasal surgery, there has long been a need for a nonreactive implant material, which does not slip or move from the site intended for its use. The implant should form a framework for the proliferation of connective tissue and blood vessels, thereby replacing emptiness with a living tissue. DeBakey double dacron velour fulfills this need.

"The early surgical concept of replacing damaged tissues with functional artificial devices has become a reality" (Hall, Liotta and DeBakey, 1956). Velour fabrics are the warp knitted felt or velvet fabrics which have been used in the clothing industry for years. The yarn is knitted in such a manner that loops of the yarn extend almost perpendicularly from the fabric surface. When viewed under magnification, the uncut pile resembles thousands of croquet wickets.

Two basic facts have been learned in the field of vascular research. These are: 1. materials such as dacron velour possess an electronegative charge which inhibits the tendency of clot formation; and 2. all synthetics, regardless of chemical or electrical properties, cause some thrombogenesis at the vascular interface. D. Liotta added a single-sided dacron or nylon velour fabric to the luminal side of blood pumps and vascular grafts. Silastic tubes with velour bonded to the outer surface have been used to inhibit infection and sinus tract formation. The many closed loops of material in the velour become enmeshed in the fibrin clot process. Microscopic studies have shown that it consists of a fibrin matrix with entrapped platelets and red and white blood cells. Fibrous tissue invasion, with all of its elements, quickly ensues.

The velour surface permits a strong mechanical bond with the fibrin deposit. This bond is so tenacious that chances of dissection and embolization are practically nil (Hall, Liotta, Chidon and DeBakey, 1967).

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Dacron velour has been used as a lining for artificial hearts, vascular grafts, heart valve coverings, penetrating conduits and artificial skin.

The coagulum, entrapped by the velour, protects the blood from further contact with a foreign substance, forming a neointima.

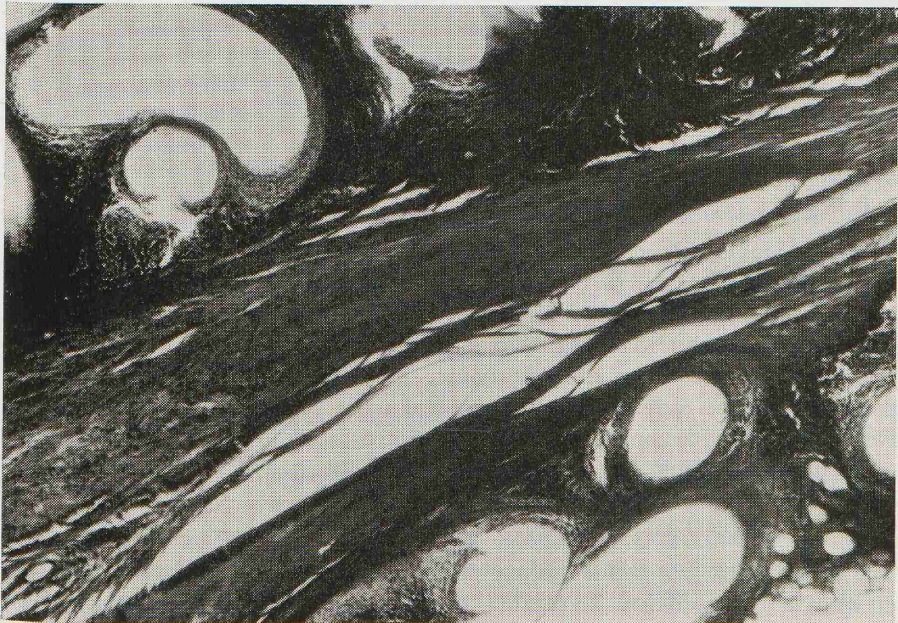
Dacron velour was first brought to my attention by a paper on the postdiathermy secondary repair of the sclera in retinal detachment surgery. Single-sided dacron velour was sutured to the sclera. Connective tissue proliferation from the sclera into the overlying velour was demonstrated, thereby protecting the eyeball by forming a strong external ocular coat.

I began to use some of the single-sided dacron velour as an intraseptal implant where no organic implant material was available. My previous experience with implanted intraseptal dacron, teflon, and nylon has been disastrous. Grafts tend to move, slipping from one area to another. They may even buckle within a given space, forming a sterile abscess.

#### LABORATORY TECHNIQUE

A three centimeter square each of teflon, nylon, dacron mesh and double dacron velour was buried in the subcutaneous tissues of a dog for six months. At the time of removal of the implants, the teflon, nylon and dacron mesh were not adherent to the surrounding tissues and there was no fibrous tissue infiltration. The dacron velour was completely adherent to the adjacent subcutaneous tissues. Microscopic examination revealed marked proliferation of fibrous tissues and all of its elements, including new blood vessel formation. (Figures 1 and 2).

Figure 1.





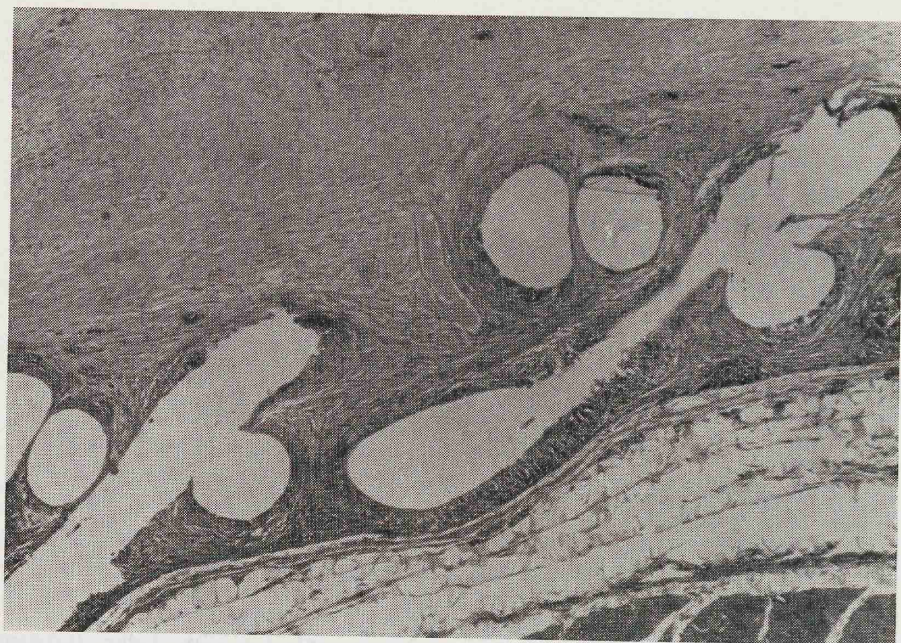


Figure 2.

#### MATERIAL

It is of interest to note that Dr. Michael DeBakey was having the same type of difficulty with his cardiac and vascular implants that I had experienced in my septum and external nasal implants, namely, slippage of the implant.

DeBakey double velour dacron fabric is produced by the USCI, a division of C. R. Bard, Inc., Billerica Massachusetts, 01821, U.S.A. The material is 1.5 millimeters thick and in square sheets 10 centimeters by 10 centimeters. It may be sterilized together with the surgical instruments.

#### CLINICAL

DeBakey double velour fabric has been implanted into a total of 75 patients during the past three years. It has been implanted into the posterior septal space of 54 patients in order to prevent postoperative mucosal contraction.

In five people who have had flaccid septums following complete submucous resections, the procedure allowed enough stiffness of the septum, facilitating the ability of the turbinates to "touch" and move back and forth. Implants of DeBakey double dacron velour were implanted, according to the Cottle technique, into the septum, the nasal floor and the lateral nasal wall of six patients.

#### TECHNICAL CONSIDERATIONS

The velour fabric may be used in any part of the nose where no tissue is available or when it is too difficult to obtain. One, two or three layers may be placed on

the dorsum for roof repair or as a true implant in the case of saddling of the dorsum. Crushed autogenous cartilage may be added to help fill the defect. Cut into small segments, it may be used to fill in supratip depressions or to finish the "toilet" of the tip.

Dacron velour implants are used: 1. in the repair of a septal abscess, replacing the dissipated cartilage; 2. in the posterior septum in cases where the perpendicular plate of the ethmoid has been transplanted to become the new caudal end of the nasal septum; 3. and in any part of the septum where bone and/or cartilage has either been lost or transplanted. The implant should be of sufficient size to allow for postoperative soft tissue contraction; 4. in the treatment of atrophic rhinitis, the response to dacron velour is much different than when bone or cartilage is used. The material is placed into position until the inferior turbinate caresses the septum. It is not packed tightly. After three weeks, the swelling recedes and the examiner may conclude that not enough has been done. Please remember, the dacron velour acts as a framework into which connective tissue proliferates. By placing small pieces in irregular positions, more connective tissue forms to fill the space of emptiness and may take up to one year before the proliferative process is completed.

#### DISCUSSION

In this series of 75 cases, there has been no postoperative swelling, infection, rejection, or slippage of the implant. The secret consists of the inertness of dacron and the perpendicular loops that entrap platelet cells, fibroblasts, etc., to form a connective tissue layer. The electronegative charge, causing a thrombogenesis, is at the surface of the implant and its loops.

#### ZUSAMMENFASSUNG

1. Es wird eine kurze Zusammenfassung der Probleme gegeben und die Anwendung von Dacron-Velour als vaskulöses Implantat dargelegt.
2. Subkutane Implantation von Dakron-Velour bei einem Versuchstier resultiert in auffallender Proliferation von zusammenhängenden Gewebe und Blutgefäßen im Implantat.
3. Doppelpes DeBakey-Velour wird für die Rekonstruktion des Dorsums, intra-septalen Implantationen und atrophischer Rhinitis empfohlen.
4. Das Velour-Implantat ist nicht allergisch und gleitet nicht.

#### RÉSUMÉ

1. Un aperçu succinct est donné des problèmes que comporte l'emploi du "Dacron Velour" dans les greffes vasculaires.
2. L'implantation subcutanée du "Dacron Velour" chez un animal canin entraîne une prolifération marquée des tissus conjonctifs et des vaisseaux sanguins dans la greffe.



3. Le double "Dacron Velour" DeBakey est présenté pour les réparations du dorsum, les implantations intraseptales et les rhinites atrophiques.
4. Le Velour n'est pas allergénique et ne glisse pas.

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Irwin E. Gaynon, M.D.,  
231 W. Wisconsin Ave,  
Milwaukee, Wisconsin 53203,  
U.S.A.