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## Prosthetic Materials in the Repair of External Abdominal Hernias in Cattle

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Of the types of external abdominal hernia encountered in cattle two, umbilical and ventral, occasionally require the use of prosthetic materials for their repair. To be successful the material used must be inert or relatively non-reactive to tissues. A variety of synthetic materials, including tantalum mesh (1, 8), nylon taffeta (10), plastic screen (7), Nylon 6 polymer mesh (9), mersilene mesh (6), polypropylene mesh (3,4,5) and stainless steel mesh (2) have been used in horses and cattle with varying degrees of success.

### Materials and Methods

A total of 17 cattle with external abdominal hernias have been treated surgically using prosthetic meshes of either stainless steel or polypropylene. The defects comprised 12 umbilical hernias, two congenital midline defects situated posterior to the umbilicus, two incisional hernias in the ventral abdomen and one traumatic low flank hernia. The surgical technique used was the same in the majority of cases but modifications were at times introduced to meet special requirements.

### Surgical Procedures and Results

All the operative procedures were carried out under general anaesthesia and with strict aseptic precautions.

#### 1) *Umbilical hernias*

The animals with umbilical hernia ranged in age from 2½ months to 7 months. Eight were female, three were castrated males and one was a bull. Three of these animals were found to have concurrent abscessation with extension of infection to the umbilical vessels or urachus. No attempt at surgical repair of the hernia was made until this infection had been overcome by drainage and irrigation. All the

hernial rings were considered unsuitable for repair by suture because of their size and/or rigidity of their margin.

Following incision of the skin, the peritoneal sac was carefully dissected down to the hernial ring and was then inverted into the abdominal cavity. Where possible the intact peritoneum was reflected from the deep fascial sheath of the rectus abdominis muscle for 13 mm. Stainless steel mesh, which is available in sheets of 50 mesh wire 0.003 inch woven measuring 30 cm x 15 cm,\* was then cut so that it overlapped the margin of the ring by the same amount. It was then placed in an extraperitoneal position between the internal rectus abdominis muscle sheath and the peritoneum and secured to the margin of the ring with at least eight horizontal mattress sutures of braided wire (Fig. 1). Situated on the inside of the open defect in this manner, the mesh has a greater mechanical advantage than if it is placed over the defect.

One of the two calves with a congenital midline defect posterior to the umbilicus was treated in identical fashion. In the other the large defect was repaired using two layers of polypropylene-knitted weave mesh. The latter is available in a range of sizes.\*\* One layer was implanted in the space between the internal rectus sheath and the peritoneum while the second layer was placed superficial to the external rectus sheath (Fig. 2) using the technique described by Johnson (1969). The borders of the mesh were rolled to prevent wrinkling and to reduce the risk of its tearing when the sutures were inserted.

Immediately, each animal regained its feet after surgery; an encircling band of elastic bandage was applied to the abdomen to provide support and to abolish dead space.

Successful repair was achieved in all but one case. When the heifer in question was admitted to the hospital, several sinuses discharging pus containing coryne bacterium pyogenes were present associated

\*Ethicon Ltd., P.O. Box 408, Bankhead Ave., Edinburgh, Scotland.

\*\*Marlex Mesh. Duval International Ltd., Freeport, Clacton, England.

with two previous attempts at repair by suture. Considerable difficulty was experienced in creating an adequate shelf to support the mesh due to the accompanying fibrosis and the danger of penetrating the peritoneum. For the first 10 days progress was satisfactory but soon after the elastic bandage was removed it became evident that the mesh had become detached along one side of the ring.

## 2) Ventral hernias

*Case 1.* A four-year-old Gelbvieh cow weighing 600 kg used for ovum transplantation had undergone a midline laparotomy on three occasions. Following the last operation the wound had become infected and a large reducible hernia developed in front of the udder. The hernial ring measured 18 cm x 12.5 cm and was not easy to define in places. There was considerable fibrosis present which made dissection of the peritoneal sac difficult. Three encapsulated abscesses associated with braided nylon sutures which had been used to close the previous laparotomy incision were encountered during this dissection. The infected tissue was excised as carefully as possible but some residual contamination was unavoidable. After the edge of the ring had been identified with some difficulty, the peritoneum was dissected free from the deep fascial sheath of the rectus for a distance of 4 cm. Two layers of stainless steel mesh were sutured in place, one deep, the other superficial, to the rectus abdominis muscle. Not surprisingly a large subcutaneous abscess developed at the site. This was drained on the 10th post-operative day by means of a 7.5 cm incision at the most dependent point of the swelling. Healing was subsequently uneventful and when the cow was discharged three weeks later the outline of the ventral abdominal wall appeared normal.

*Case 2.* A five-year-old Guernsey cow weighing 360 kg developed an incisional hernia in the right paramedial area after an operation to correct left displacement of the abomasum 6 months earlier. It was situated 9 cm caudal and slightly lateral to the xiphoid cartilage and the ring measured 11.5 x 6.5 cm. The intact peritoneal lining was dissected free and two layers of stainless steel mesh were used to cover the defect as in Case 1. As soon as the cow regained her feet a canvas abdominal girdle was strapped in place. The wound healed by first intention. The skin sutures were removed on the ninth day but the girdle was kept on for a further 14 days.

*Case 3.* A six-year-old Friesian cow in which a large hernia had developed low in the left flank six days earlier while she was at grass with the rest of the herd. In this instance the peritoneum had been torn in addition to the muscle layers and as a result approximately 2 m of small intestine had come to a subcutaneous position. Once the damaged musculature had been exposed by a 20 cm skin incision and the intestine had been returned to the abdominal cavity it became evident that the size of the defects and the friability of the muscles would not allow repair by

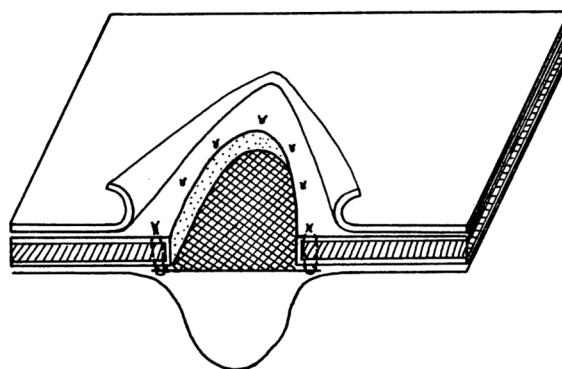


Figure 1. Schematic representation of a hernial ring with a single layer of stainless steel mesh placed between the internal rectus abdominis sheath and the peritoneum.

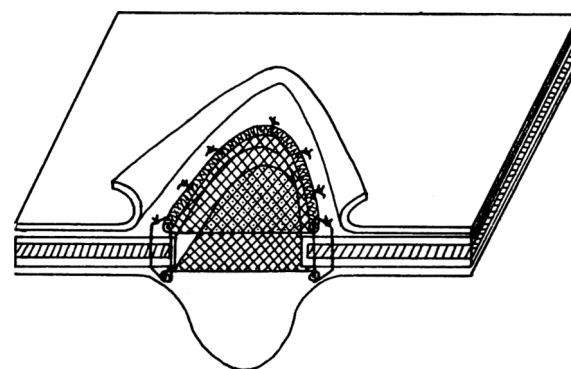


Figure 2. Schematic representation of closure of a hernial ring using two layers of polypropylene mesh (after Johnson).

simple suturing. The tears in the muscles or their aponeuroses had occurred along the direction of the fibers. One layer of polypropylene was placed within the abdominal cavity and sutured under tension to the overlying transversus abdominis muscle. A second layer was sutured in place on the deep face of the internal oblique muscle. The extent of the split in the external oblique muscle was difficult to define but it was possible to approximate the edges using interrupted sutures of No. 3 chromic catgut.

The cow's post-operative progress was uneventful. The contour of the abdominal wall returned to normal and several months later no signs attributable to adhesions between the abdominal visceral and the mesh had appeared.

## Discussion

Both stainless steel and polypropylene mesh appear to be highly satisfactory materials for bridging large abdominal wall defects or hernias in cattle and horses. They are easily manipulated and stimulate sufficient fibroplasia to correct the defect and thus strengthen the abdominal wall at the implant site. It is largely a matter of personal preference which material is used but cost is an important consideration and polypropylene is four times as expensive as





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<sup>1</sup>"Money Returns," National Mastitis Council, 1974 <sup>2</sup>Brander, G.C., "Dry Cow Therapy As A Means of Controlling Bovine Mastitis," Vet Rec. 84, No. 17, 445 (1969), Tadworth, England. <sup>3</sup>Hill, G.N., D.V.M., Keefe, Thomas J., D.V.M., Modern Veterinary Practice, Nov. 1974



stainless steel. Except in the case of very large defects or in adult animals where the repair is subjected to great stress, a single layer of stainless steel mesh is adequate. Limited personal experience with the more flexible polypropylene mesh indicates that it may be preferable to use two layers routinely because of the more immediate physical support they provide. Polypropylene is of particular value in cases where there is a peritoneal defect. Johnson has shown experimentally that (3, 4, 5) provided it is laid carefully under even tension to eliminate wrinkles, only minimal adhesions develop and these cause no untoward effects.

The lack of tissue reaction to these materials even in the presence of infection is significant because infection may already be present from previous attempts at repair of a hernia or closure of a laparotomy incision. Whenever possible the infection should be overcome prior to repair of the hernia but this is occasionally difficult because excision of the infected tissue entails further weakening of the abdominal wall at the site. In such cases, therefore, it is necessary to insert the prosthetic material at the

same time as performing the debridement. Although abscessation may follow, experience has shown that this can be overcome by the use of antibiotics and local drainage without having to remove the mesh.

#### References

1. Hamilton, D. P., Nelson, D. R., and Hardenbrook, H. J. (1974). Repair of Ventral Abdominal Hernia in a Horse, using Tantalum Mesh. *J.A.V.M.A.*, 164, 1204-1205. - 2. Heinz, C. D., Bullar, J. F., and Johnson, L. E. (1972). *Eq. Med. and Surg.*, 2nd Ed., Am. Vet. pub., 858. - 3. Johnson, J. H. (1967). Surgical Implantation of Polypropylene Mesh in the Abdominal Wall of the Equine Species. *Proc. Am. Assoc., Equ. Pract.*, 13, 333-339. - 4. Johnson, J. H. (1969). An evaluation of Polypropylene implants in Ponies. *J.A.V.M.A.*, 154, 779-785. - 5. Johnson J. H. (1969). Use of Polypropylene Mesh as a Prosthetic Material for Abdominal Hernias in Horses. *J.A.V.M.A.*, 155, 1589-1594. - 6. Numans, S. R., and Wintzer, H. J. (1964). Zur Alloplastik in der Hernienbehandlung bei grossen Haustieren' *Wien Tierarztl Monatschr.*, 51, 433-440. - 7. Stapp, R. W. (1960). Repair of Umbilical Hernias with Plastic Screen. *Mod. Vet. Pract.*, 41, 60. - 8. Whitcomb, O. W. (1955). Tantalum Mesh in the Repair of Recurrent Abdominal Hernias of Horses and Cattle. *Iowa State Coll. Vet.*, 17, 143-144. - 9. Wintzer, H. J. (1962). Methods for Surgical Treatment of Bovine Abdominal Hernias. *J.A.V.M.A.*, 141, 131-134. - 10. Wion, J. E. (1957). A New Technique for Hernial Repair in Large Animals. *J.A.V.M.A.*, 131, 56-58.

## Udder Surgery

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The treatment of mastitis and lesions of the teats encompasses about 40 per cent of the daily work of a practitioner in a dairy-cattle district in Denmark. Treatment of teats after contusions, teat wounds, teat stricture and stenosis encompasses only 10 per cent of his daily work and 30 per cent is related to mastitis. It is well known that consultations are more frequent in districts with small livestock where the reduction of the milkyield from a single cow is of more economic importance than it is for large livestock. An indication of the importance of teat stricture (stenosis) is the production of instruments. A single Danish company produces five million bourgies per year. About one million are used in Denmark and the remainder are exported to Northern Europe, Canada, Australia and New Zealand.

The published experiences concerning teat-diseases come mainly from practitioners in Switzerland, but also from those in the Netherlands, Denmark and other countries breeding dairy cattle. At international meetings, teat diseases are normally not discussed and this is the reason for this short report.

The surgical treatment of teat diseases is very often related to the supply of instruments on the market. A survey of the instrument catalogues shows that a sur-

prising number of old-fashioned instruments are still on the market and must be sold and used. Consequently, it will be necessary to make some remarks about the instruments which have to be used by Danish practitioners in the treatment of traumatic teat diseases.

Practically all dairy cattle are now dehorned to prevent traumatic injuries of the udder and teats. Barbed wire around fields is now replaced with electric wire and in this way big lesions and wounds have been reduced. Farmers no longer breed cattle with huge teats which were important in the handmilking days. Cattle with especially big udders and big teats in the first weeks after calving will be treated preventively against traumatic lesions by the wellknown Dutch udder bag. Many traumatic diseases will therefore be contusions as a result of trampling with or without wounds and the strictures in the teat canals will normally have some relation to the permanent high vacuum in the milking machine.

Practitioners normally use Rompun anaesthesia, since they have the impression that local injection of anaesthetic gives more trouble and pain for the animal. Simple wounds are normally sutured by agraffes (clamps) placed close to each other. These methods are also used for small penetrating wounds combined with a teat canula. The surgical technique for large penetrating wounds is normally the following: to be free of the permanent stream of milk, a teat tube is inserted and the practitioner uses an Esmark's sling around the base of the teat. The wound is closed with interrupted sutures using an