

# Alloplastic Replacement of the Partially Resected Canine Urethra by Expanded Polytetrafluoroethylene Grafts

## Preliminary Results

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**Summary.** In 12 male dogs 3-8 cm of the penile urethra were resected and replaced by expanded polytetrafluoroethylene (GORE-TEX®) grafts. Follow-up consisted of periodic urethrograms. Maximum observation time has been 12 months. Up to now, no major complications were noted. Tissue reactions were minimal and patency of all grafts was demonstrated during the follow-up period.

**Key words:** Alloplastic urethral replacement, Urethral substitution.

The reconstruction of the urethra for long strictures and traumatic defects still represents a major urological problem. Internal urethrotomy and the numerous variations of external urethroplasty are not always successful. Resection of the stricture and repair of the defect with a graft may be possible in selected cases. Various homografts such as lyophilised veins and dura (8, 9, 10, 11) and alloplastic materials such as Teflon, Dacron and Silicone (3, 4, 6, 7) have been tried with partial success for the replacement of the urethra. The preliminary results of experiments investigating the subtotal substitution of the canine urethra by expanded polytetrafluoroethylene (Gore-Tex®) grafts are presented in this paper.

## MATERIAL AND METHODS

After premedication with Combelen®<sup>®</sup>, 12 male dogs, weighing between 18 and 25 kg were anaesthetised by intravenous Nembutal®<sup>®</sup>. Anaesthesia was maintained by a Fluothane-N<sub>2</sub>O-O<sub>2</sub>-mixture without relaxation. Through a midline incision 3-8 cm of the penile urethra and corpus spongiosum were exposed, dissected free and resected (Fig. 1a). A polyethylene chloride splint (6F) was in-

serted through the proximal urethra into the bladder. A polytetrafluoroethylene (Gore-Tex®) graft of appropriate length was placed over the splint and the proximal anastomosis performed by a continuous suture with 5/0 Prolene®<sup>®</sup>. The splint was then inserted into the distal urethra and the distal anastomosis sutured. The splint was removed and the water tightness of the anastomoses checked by the injection of 10 ml of saline into the urethra. Meticulous haemostasis was performed. Figure 1b shows the operative view after urethral replacement. The wound and skin were closed in layers with 3/0 catgut and Prolene®<sup>®</sup> sutures respectively. Postoperative urethral splints were not used routinely. Urethrograms were performed at intervals of 3-4 weeks.

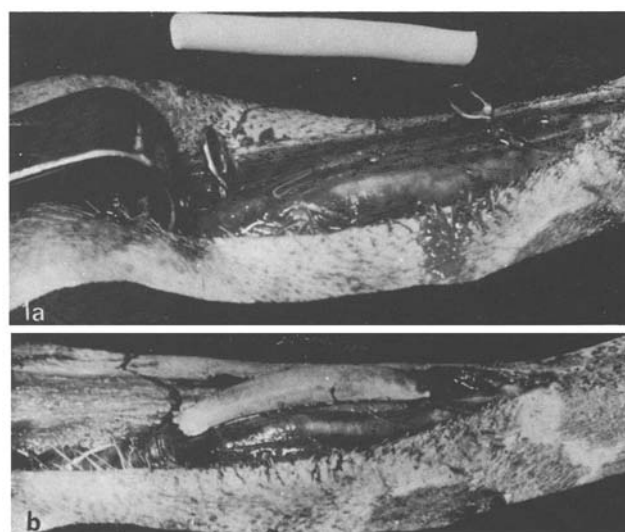


Fig. 1a and b. Replacement of the penile canine urethra by expanded polytetrafluoroethylene (Gore-Tex®) graft: a. 4 cm of the urethra have been resected, the proximal and distal ends of the urethra are marked by Largiadier's clamps; graft above. b. urethral replacement has been performed



Figs. 2-5. Replacement of the canine urethra by expanded polytetrafluoroethylene. Urethrograms of different dogs 3 months (Fig. 2), 6 months (Fig. 3), 9 months (Fig. 4) and 12 months (Fig. 5) post-operatively

## RESULTS

Postoperative complications occurred in three dogs. Two dogs developed periurethral haematomas which had to be evacuated on the day after the operation. In one dog a fistula was observed three days postoperatively. The fistula closed spontaneously after temporary insertion of an urethral splint. No further complications were noted. Slight initial haematuria was observed during the first 10-14 postoperative days. The retrograde urethrograms (Figs. 2-5) showed slight narrowing of the anastomoses during the first 4 weeks, probably due to oedema of the urethra. All dogs had a good urinary stream. The longest observation period is 12 months.

## DISCUSSION

Numerous procedures for the operative management of urethral strictures have been suggested. The long term results of internal urethrotomy are controversial and most external urethroplasties are carried out by using skin for the partial replacement of the urethra. Total alloplastic replacement of the urethra has proven difficult in man (2, 10, 11) for the lack of an appropriate material. Moulonguet (10) and Vincent (11) reported experiences of urethral replacement by silicone prostheses in five patients. Satisfactory results, however, were only observed in one patient, the observation period extending to 7 months. Urethral replacement was unsuccessful in the other patients, due to encrustation and migration of the graft.

Encouraging experimental results of total replacement of the canine urethra by lyophilised human dura and collagen-dacron tubes have been reported by Kelami (8). Poor results were observed by the same author when simple collagen tubes were used. Recently Kjaer (9) reported promising results of canine urethral replacement by lyophilised vein homografts. Preliminary experience with expanded polytetrafluoroethylene grafts indicate that this prosthetic material, manufactured from an expanded, highly porous form of Teflon, originally used for vascular prostheses (1, 2, 5), may be used as urethral substitute. It is available in any length and in diameters from 5-8 mm. As no severe tissue reactions have been observed so far, the material seems to be well tolerated. It must be emphasised, however, that the observation time is too short for a final evaluation. Before clinical trials are justified, further experiments with extended long term follow-up, including histological studies will have to be carried out.

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