

A PREPUBIC URETHROSTOMY IN A BITCH AFTER RESECTION OF THE VAGINA AND THE DISTAL PART OF THE URETHRA

Een prepubische urethrostomie bij een teef na resectie van de vagina en van het distaal deel van de urethra

M. Risselada¹, H. de Rooster², T. Waelbers², C. van Geffen², K. Vermote², M. Kramer³

¹ Department of Medical Imaging of Domestic Animals, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, B-9820 Merelbeke

² Department of Medicine and Clinical Biology of Small Animals, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, B-9820 Merelbeke

³ Klinik für Kleintiere, Chirurgie, Fachbereich Veterinärmedizin, Justus-Liebig-Universität Giessen, Frankfurter Straße 108, D-35392 Giessen
Marije.Risselada@Ugent.be

ABSTRACT

This case report describes the surgical procedure for prepubic urethrostomy in the female dog, documented in a case in which it was used after resection of vaginal neoplasia. Prepubic urethrostomy is indicated as a salvage procedure in cases where there is not sufficient urethral length left to perform a perineal urethrostomy. This loss of urethral length can be due to extensive resection for oncologic surgery or extensive tissue trauma. The main complication that can occur in this type of urethrostomy is urinary incontinence.

SAMENVATTING

In deze casuïstiek wordt de chirurgische techniek van een prepubische urethrostomie beschreven aan de hand van een geval waarin zij gebruikt werd bij een teef na het verwijderen van een vaginale neoplasie. Deze techniek is een optie wanneer er niet voldoende urethralengte over is om een perineale reconstructie te maken. Dit is meestal het geval na een uitgebreide resectie voor neoplasie of trauma. Urine-incontinentie is de belangrijkste complicatie die gezien wordt bij een prepubische urethrostomie.

INTRODUCTION

In animals with abnormalities of the distal urinary tract, such as extensive trauma or neoplasia, or in bitches with malignant neoplasia in the vagina, extensive resection and creation of a new urethral stoma is required. Surgically, the urethra can be exposed through an abdominal (with or without pelvic osteotomy or ostectomy) or vestibular approach (Salomon *et al.*, 2004). Several surgical options are available for reconstruction of the distal urinary tract in female dogs. All possible surgical procedures have limitations, which are described below.

A temporary Foley cystostomy tube is an effective temporary diversion technique that can be used in cases where there is concern about the patency of a urethral

anastomosis, or in conservative management of small urethral tears (Stone *et al.*, 1984; Dhein *et al.*, 1989; Williams and White, 1991). It has also been described as a palliative procedure for urinary outflow obstruction in dogs with neoplasia, without directly treating the tumor (Smith *et al.*, 1995). If the length of the Foley cystostomy tube proves to be cumbersome, a low profile tube with a length of less than 4 cm and equipped with an anti-reflux valve can be placed (Stiffler *et al.*, 2003).

Distal urethral lesions in bitches can be managed by surgically creating a new anastomosis between the vagina and the urethra. Vaginourethroplasty also requires sufficient length of the urethra (Davies and Read, 1990; White *et al.*, 1996).

Vulvovaginectomy and perineal urethrostomy permit resection of large tumors involving vulva and vagina, including the distal part of the urethra (Bilbrey *et al.*, 1989). These procedures are associated with relatively low morbidity. One of the limiting factors in this surgery is the extent of diseased urethra that has to be resected. It is important to create a tension free perineal stoma, as tension predisposes to stricture formation or dehiscence (Bilbrey *et al.*, 1989; Dean *et al.*, 1990). This might prove difficult in cases where a large amount of tissue needs to be resected because of the size of the disease process or because of the necessity to obtain tumor free margins.

A prepubic urethrostomy is the creation of a stoma cranial (rostral) to the pecten of the pubis, in cats and female dogs in the midline or slightly to one side (while avoiding the mammary glands) and in male dogs pararepucially (Yoshioka and Carb, 1982; Stone *et al.*, 1984; Bradley, 1989). The proximal urethra should be kept as long as possible to minimize the risk of urinary incontinence. However, more important than urethral length is the preservation of its innervation, vascular supply and sphincter mechanism (Yoshioka and Carb, 1982; Stone *et al.*, 1984; Dean *et al.*, 1990; Baines *et al.*, 2001).

Subpubic or transpelvic urethrostomy – a modification of prepubic urethrostomy – has been described as a salvage surgery after failed perineal urethrostomy in tomcats. This type entails removing part of the pubic bone in order to create a ventral stoma, which makes it a more invasive procedure although fewer postoperative complications are reported compared to prepubic urethrostomy (Ellison *et al.*, 1989; Bernarde and Viguier, 2004). Clinical studies of postoperative results and complications after this technique have not been reported for canine patients, however.

Another possible salvage surgery is ureterocolonic implantation (ureterocolonic anastomosis). Strictly speaking, this is not a urethral diversion technique. This technique entails bypassing the urinary bladder and urethra and is an option if surgical management of trigonal cystic neoplasia or of the proximal urethra is attempted (Stone *et al.*, 1988b). However, these animals suffer from severe biochemical imbalances (azotemia, hyperammonemia, hyperchloremia and metabolic acidosis) causing gastrointestinal and neurological abnormalities. Furthermore, there is a danger for ascending infections of the ureter and even of the kidneys (Stone *et al.*, 1988a&b).

CASE DESCRIPTION

Clinical evaluation

A 12-year-old, intact female mixed breed dog, weighing 28.5 kg was presented to the Department of Medicine and Clinical Biology of Small Animals, Ghent University, with hemorrhagic vulvar discharge of 3 months duration. The clinical signs had started after the last heat and had progressed from intermittent to continuous. This was unrelated to urination. No clinical signs suggesting mechanical interference by surrounding tissues, lower urinary tract disease or urinary incontinence were present. There was no history of other concurrent problems. Symptomatic treatment with sulfamethoxazole/trimethoprim (800/160 mg) (Bactrim®, Roche) and an aspecific hemostatic agent, etamsylate (Dicynone®, Sanofi-Synthelabo), had been instituted by the referring veterinarian, though without clinical improvement. On admission, the dog was alert and slightly obese (Body Condition Score 4/6). The rectal temperature was 38.9°C, the mucous membranes were pink with a normal capillary refill time and the heart rate was 120 beats per minute with normal pulse quality. No abnormalities were detected on thoracic auscultation and abdominal palpation. On vulvar inspection, no protruding masses or other abnormalities were noted except for a small amount of bloody discharge. Digital examination of the vaginal vestibule revealed an irregular non-pedunculated soft tissue mass at the level of the pelvic outlet, extending cranially into the pelvic canal. During vaginoscopy, the vaginal urethral orifice could not be visualized because it was completely obscured by the mass. Abdominal radiography and ultrasonography were within normal limits. Complete blood count including platelet count, biochemistry profile and coagulation profile were unremarkable. Multiple small biopsies were taken per vaginam after applying a topical anesthetic (Lidocaine, Xylocaine® 2% Gel, Astra Zeneca, Brussels, Belgium) and submitted for histopathologic examination.

The presumptive diagnosis of the vaginal biopsies was fibrosarcoma, and the dog was scheduled for both oncologic and reconstructive surgery 2 weeks after the initial consultation, on the first possible occasion after obtaining the biopsy results.

Surgery

Pre-anesthetic evaluation at that time did not reveal any significant abnormalities. After placement of a

20G intravenous catheter in the accessory cephalic vein, the dog was premedicated intravenously with a mixture of acepromazine maleate 0.01 mg/kg (Placivet®, Codifar) and methadone 0.1 mg/kg (Mephenon®, Denolin, Brussels, Belgium). Endotracheal intubation was performed after induction with propofol 4 mg/kg (Rapinivet®, Schering Plough) IV to effect. Amoxicillin (20mg/kg BW, Clamoxyl®, Glaxo SmithKline, Genval) was given intravenously at the induction and clavulanic acid potentiated amoxicillin at a dose of 12.5 mg/kg BW (Synulox RTU®, Pfizer Animal Health, Nossegem, Belgium) was administered subcutaneously.

After intubation the dog was placed in lateral recumbency and an epidural administration of a mixture of lidocaine 2% (Xylocaine®, Astra Zeneca, Brussels, Belgium), bupivacaine 0.5% (Marcaine®, Astra Zeneca, Brussels, Belgium) and methadone 0.1 mg/kg (Mephenon®, Denolin, Brussels, Belgium) in a total volume of 1 ml/4.5 kg was performed. Anesthesia was maintained with isoflurane (Forene®, Abbott) in oxygen and nitrous oxide using a commercial circle system (Dräger, Narcose Spiromat 656). Lactated Ringer's solution was administered at a rate of 10 ml/kg/h intravenously. Monitoring included capnography (Datex® capnomac ultima), pulse oximetry (Nellcor®), electrocardiography (Lifescope®, Nihon) and non-invasive blood pressure measurement (Dinamap®).

A midline laparotomy was performed, extending from the umbilicus to the pubis, with the skin incision extending further caudally to accommodate the performance of a symphysiotomy of the pubis. The adductor muscles were detached from the os pubis using a periosteal elevator, leaving their lateral attachment intact. The symphysiotomy was performed using an oscillating saw with a 10 mm blade. The ovariohysterectomy was started at the ovaries; bilaterally the ovarian artery and vein were double ligated using 2-0 polyglactin 910 (Vicryl®, Ethicon, Johnson-Johnson Intl, Brussels, Belgium). The mesometrium was single ligated (2-0 polyglactin 910). Macroscopically, the cervix looked normal but the vagina had an irregular thickened aspect starting approximately at the level of the pecten of the pubis, and extending into the vulvar vestibule.

The tumor was bluntly dissected from the surrounding tissues. The urethra was also dissected from its soft tissue attachment to the vagina and resected slightly proximally to the urethrovaginal junction, as we feared that a too extensive dissection would compromise the

neurological and vascular supply. Macroscopically, however, the urethra did not seem involved in the neoplastic process. The vagina was amputated caudal to the tumor and the lumen was closed using simple interrupted sutures (2-0 polyglactin 910). The neoplastic lesion was removed with the remainder of the uterus and ovaries. The cut end of the urethra was brought extraabdominally through a separate stab incision of 2 cm length paramedian on the right side. A stoma was created by suturing the urethral mucosa to the skin using simple interrupted sutures in 5-0 poliglecaprone 25 (Monocryl®, Ethicon, Johnson & Johnson Intl, Brussels, Belgium). The symphysiotomy was closed using 4 cerclage wires (0.9 mm diameter) through predrilled holes. The adductor muscles were approximated to each other using 2-0 polydioxanone (PDS II®, Ethicon, Johnson & Johnson Intl, Brussels, Belgium) in a simple continuous pattern. The abdominal incision was closed routinely using simple interrupted sutures (0 polydioxanone) for the abdominal fascia, simple continuous subcuticular (2-0 poliglecaprone 25) and simple interrupted skin sutures in 2-0 nylon (Ethilon®, Ethicon, Johnson & Johnson Intl, Brussels, Belgium). A Foley catheter (8Fr; Global Veterinary Products Inc, Agitronics, Belgium) was maintained through the prepubic stoma for the first 3 days postoperatively.

Post operative analgesia was provided by 0.1 mg/kg of methadone (Mephenon®, Denolin, Brussels, Belgium) at the end of the surgery and repeated every 4 hours. Additional post-operative analgesia was provided with a fentanyl patch (Durogesic® 100 µg/h, Janssen-Cilag, Berchem, Belgium) placed on the left hind limb for 3 days and 4 mg/kg carprofen (Rimadyl®, Pfizer, Louvain-la-Neuve, Belgium) once daily for 3 days. Antibiosis was provided by clavulanic acid potentiated amoxicillin at a dose of 12.5 mg/kg BW (Synulox Smakelijke tabletten®, Pfizer Animal Health, Nossegem, Belgium) given orally.

Follow-up

The histology results for the surgically excised sample revealed a leiomyosarcoma. The distal margin was not completely free of tumor cells. No evidence of urethral involvement was found on histopathology.

At suture removal (15 days postoperatively) the celiotomy wound and the prepubic stoma had healed without complications. There was no urine scalding around the stomal site. The dog urinated normally with only a mild urinary dribbling after voiding.

Forty-three days postoperatively the dog was incontinent, and showed recurrence of vulval blood loss. A 14 day course of clavulanic acid potentiated amoxicillin was instituted as treatment for suspected urinary tract infection.

Long-term telephone follow-up revealed that the dog was euthanized 7 months postoperatively due to abdominal enlargement and anorexia, presumably due to metastasis to the liver, although this was not confirmed by autopsy. The dog remained continent after the course of clavulanic acid potentiated amoxicillin, although she did lose some drops of urine immediately after urinating. The vulvar blood loss did not cease. Some peristomal reaction developed after several months. The owners assessed her situation as clinically good for a couple of months, but it worsened rapidly after that.

DISCUSSION

Except for transmissible venereal tumors, most vaginal neoplastic lesions are of smooth muscle or fibrous tissue origin (Brodey and Roszel, 1967; Thacher and Bradley, 1983). In the reported case, the biopsy samples taken per vaginam were indicative of a fibrosarcoma. Oncologic surgery and a prepubic urethrostomy were proposed. To ensure tumor-free margins, vaginectomy in conjunction with urethroplasty is generally necessary for treatment of non-pendunculated vaginal tumors (White *et al.*, 1996; Salomon *et al.*, 2004).

The ultimate histopathologic diagnosis of the resected tumor was a leiomyosarcoma, no evidence of fibrosarcoma was found in the final sample. As the original biopsy diagnosis was obtained from a small sample, it is likely that reactive tissue was biopsied. The presumptive diagnosis could have been confirmed by using special stains, but as this would have prolonged the time until definitive surgery or a second biopsy, the decision was made to schedule surgery based on the presumptive diagnosis. The final diagnosis was a leiomyosarcoma, the most common malignant tumor seen in vaginal and vulvar lesions in the bitch (Klein, 1996). Tumor regrowth was clinically suspected in this case 2 months after surgery, which corresponds to the high local recurrence rates cited for malignant vaginal neoplasias (Klein, 1996).

The growth of the benign tumors of the genital tract does appear to be hormonally influenced; the association between recent estrous cycles and pseudogravidity may also suggest hormonal influence. Hormonal influence on the growth of malignant tumors has not

been reported (Thacher and Bradley, 1983). In the bitch in our report an ovariohysterectomy was performed to allow complete resection of the tumoral mass, so no possible hormonal influence was involved in the suspected regrowth of the tumor, which was more likely due to incomplete removal of tumoral margins at the distal part of the resection.

Prepubic urethrostomy entails creating a urethrostomy opening on the ventral surface of the abdomen cranial to the pubis. It is a salvage procedure for trauma (Bradley, 1989; Boothe, 2000), for neoplasia to the distal urethra or vagina (Yoshioka and Carb, 1982; Stone *et al.*, 1984; Bradley, 1989; Leon *et al.*, 1997), or for urethral obstruction in male animals (Brodey and Roszel, 1967; Bradley, 1989; Leon *et al.*, 1997; Stone *et al.*, 1997; Baines *et al.*, 1991).

In the present case, the surgical technique of prepubic urethrostomy was chosen because of the limited length of urethra remaining after tumor removal. An urethrovulvar reconstruction would have placed too much tension on the stoma site.

The main reported complications after prepubic urethrostomy in different species are urinary incontinence, recurring ascending cystitis, peristomal skin irritation, and stricture at the stomal site (Bradley, 1989; Leon *et al.*, 1997; Stone *et al.*, 1997; Mahler and Guillo, 1999; Baines *et al.*, 2001). The proximal urethra should be kept as long as possible to minimize the risk of urinary incontinence. The clinical outcome in 5 cases of vaginourethroplasty suggests that resection of the distal third of the urethra including the vaginal urethral orifice is possible with maintenance of urinary continence (White *et al.*, 1996), but preservation of the innervation and vascular supply to the bladder and proximal urethra is considered extremely important (Yoshioka and Carb, 1982; Stone *et al.*, 1984; Dean *et al.*, 1990; Baines *et al.*, 2001).

The incontinence at 43 days postoperatively in our case could have been due to cystitis, tumoral ingrowth, insufficient urethral length or damage to the neurovascular supply of the urethral remnant. Infiltrative urethral disease has been found to be uncommon in dogs (Moroff *et al.*, 1991). During the surgery no macroscopical abnormalities were found in the distal urethra. This makes tumoral ingrowth less likely as a cause for the urinary incontinence at 43 days postoperatively. Antibiotic therapy covering the most likely pathogens involved in uncomplicated cystitis was instituted to rule out infection as a possible cause. A bacteriological culture of urine, taken by means of cystocentesis,

would have provided definitive diagnosis of urinary tract infection, but this was not performed. However, as she remained continent for the remainder of her life, the incontinence probably was due to a urinary tract infection and less likely to insufficient urethral length or damage to the neurovascular supply. It is believed that the shorter length of the urethra after prepubic urethrostomy predisposes to ascending urinary tract infection (Leon *et al.*, 1997; Stone *et al.*, 1997), which might also have occurred in this case.

Some moistness of the skin surrounding the urethral stoma rather than urinary incontinence was reported in a goat, a sheep and two pigs after prepubic urethrostomy (Stone *et al.*, 1997; Leon *et al.*, 1997). The dog in this case had some urine dribbling (some drops) immediately after voiding.

Although the dog presented in this case report was euthanized after 7 months, she did have a good quality of life for the first months postoperatively, according to her owners. The decline in her condition afterwards probably was due to metastasis, judging from the clinical signs as well as the reported high metastatic rates for malignant vaginal neoplasias (Klein, 1996).

CONCLUSION

When care is taken not to damage the neurovascular supply to the urethral remnant, prepubic urethrostomy is a viable surgical option either for definitive surgical correction or for palliative surgery, bypassing distally located lesions. However, the owner should be warned about the possibility of urinary incontinence.

REFERENCES

- Baines S.J., Rennie S., White R.A.S. (2001). Prepubic urethrostomy: A long-term study in 16 cats. *Veterinary Surgery* 30, 107-113.
- Bernarde A., Viguier E. (2004). Transpelvic urethrostomy in 11 cats using an ischial osteotomy. *Veterinary Surgery* 33, 246-252.
- Bilbrey S.A., Withrow S.J., Klein M.K., Bennett R.A., Norris A.M., Gofton N., DeHoff W. (1989). Vulvovaginectomy and perineal urethrostomy for neoplasms of the vulva and vagina. *Veterinary Surgery* 18, 450-453.
- Boothe H.W. (2000). Managing traumatic urethral injuries. *Clinical Techniques in Small Animal Practice* 15, 35-39.
- Bradley R.L. (1989). Prepubic urethrostomy. An acceptable urinary diversion technique. *Problems in Veterinary Medicine* 1, 120-127.
- Brodey R.S., Roszel J.F. (1967). Neoplasms of the canine uterus, vagina, and vulva: a clinicopathologic survey of 90 cases. *Journal of the American Veterinary Medical Association* 151, 1294-1307.
- Davies J.V., Read H.M. (1990). Urethral tumours in dogs. *Journal of Small Animal Practice* 32, 131-136.
- Dean P.W., Hedlund C.S., Lewis D.D., Bojrab M.J. (1990). Canine urethrotomy and urethrostomy. *Compendium of Continuing Education* 12, 1541-1554.
- Dhein C.R., Person M.W., Leathers C.W., Gavin P.R. (1989). Prepubic (suprapubic) catheterization of the dog. *Journal of the American Animal Hospital Association* 25, 261-271.
- Ellison G.W., Lewis D.D., Boren F.C. (1989). Subpubic urethrostomy to salvage a failed perineal urethrostomy in a cat. *Compendium of Continuing Education* 11, 946-951.
- Klein M.K. (1996). Tumors of the female reproductive system. In: Withrow S.J. and MacEwen G. (editors). *Small Animal Clinical Oncology*. 2nd ed. W.B. Saunders, Philadelphia, p.347-355.
- Leon J.C., Gill M.S., Cornick-Seahorn J.L., Hedlund C.S., Hosgood G. (1997). Prepubic urethrostomy for permanent urinary diversion in two Vietnamese pot-bellied pigs. *Journal of the American Veterinary Medical Association* 210, 366-368.
- Mahler S., Guillo J.Y. (1999). Urétrostomie antépubienne chez trois chats et un chien: technique chirurgicale et résultats à long terme. *Revue Médecine Vétérinaire* 150, 357-362.
- Moroff S.D., Brown B.A., Matthiesen D.T., Scott R.C. (1991). Infiltrative urethral disease in female dogs: 41 cases (1980-1987). *Journal of the American Veterinary Medical Association* 199, 247-251.
- Salomon J.F., Deneuche A., Viguier E. (2004). Vaginectomy and urethroplasty as a treatment for non-pedunculated vaginal tumours in four bitches. *Journal of Small Animal Practice* 45, 157-161.
- Smith J.D., Stone E.A., Gilson S.D. (1995). Placement of a permanent cystostomy catheter to relieve urine outflow obstruction in dogs with transitional cell carcinoma. *Journal of the American Veterinary Medical Association* 206, 496-499.
- Stiffler K.S., McCrackin Stevenson M.A., Cornell K.K., Glerum L.E., Smith J.D., Miller N.A., Rawlings C.A. (2003). Clinical use of low-profile cystostomy tubes in four dogs and a cat. *Journal of the American Veterinary Medical Association* 223, 325-9, 309-10.
- Stone E.A., Goldschmidt M.H., Walter M.C. (1984). Urinary diversion. *Veterinary Clinics of North America: Small Animal Practice* 14, 123-131.
- Stone E.A., Walter M.C., Goldschmidt M.H., Biery D.N., Bovee K.C. (1988a). Ureterocolonic anastomosis in clinically normal dogs. *American Journal of Veterinary Research* 49, 1147-1153.
- Stone E.A., Withrow S.J., Page R.L., Schwarz P.D., Wheeler S.L., Seim III H.B. (1988b). Ureterocolonic anastomosis in 10 dogs with transitional cell carcinoma. *Veterinary Surgery* 17, 147-153.

- Stone W.C., Bjorling D.E., Trostle S.S., Hanson P.D., Markel M.D. (1997). Prepubic urethrostomy for relief of urethral obstruction in a sheep and a goat. *Journal of the American Veterinary Medical Association* 210, 939-941.
- Thacher C., Bradley R.L. (1983). Vulvar and vaginal tumors in the dog: A retrospective study. *Journal of the American Veterinary Medical Association* 183, 690-692.
- White R.N., Davies J.V., Gregory S.P. (1996). Vaginourethroplasty for treatment of urethral obstruction in the bitch. *Veterinary Surgery* 25, 503-510.
- Williams J.M., White R.A.S. (1991). Tube cystostomy in the dog and cat. *Journal of Small Animal Practice* 32, 598-602.
- Yoshioka M.M., Carb A. (1982). Antepubic urethrostomy in the dog. *Journal of the American Animal Hospital Association* 18, 290-294.

Uit het verleden

VAN DIERENFYSIOLOGIE NAAR ONDERGOED

Het succesverhaal van Prof. Gustav Jaeger (1832 – 1917)

Gustav Jaeger, arts en professor in de fysiologie en histologie aan de veeartsenijsschool in Stuttgart gevestigd in 19^{de} eeuw, ontwikkelde een merkwaardige theorie die resulteerde in een gigantisch commercieel succes. Hij was een aanhanger van de homeopathische leer van Hahnemann en specialiseerde zich in het onderzoek van bedmateriaal en ondergoed. Aan de hand van een door hem ontwikkelde 'neuroanalyse' stelde hij vast dat plantenvezels, zoals katoen en linnen, verlamdend werken. De uitwasemingen van het lichaam die toxische afvalstoffen bevatten, zouden daardoor terug geresorbeerd worden en zich opstapelen met zwakte of ziekte tot gevolg. Hierin toonde hij zich een volmaakte volgeling van Paracelsus die zijn geneesleer stelde op de 'zuivering' van het lichaam van toxische stoffen, nog steeds een populaire stroming in de volksgeneeskunde. Een bijkomende theorievariante door Jaeger ontwikkeld, aanzag die uitwasemingen (en zweet) als voedingsbodem voor schadelijke bacteriën.

Dierlijke vezels zouden dat niet doen. Dieren werden volgens Jaeger veel minder ziek dank zij hun vacht. Maar aangezien de schamele menselijke beharing onvoldoende warmte geeft in ons kille klimaat om er in 'natuurlijke' staat bij te lopen, luidde het voorschrift dat men zich het liefst helemaal van kop tot teen in wollen stoffen moest hullen. 's Avonds moest men ook letterlijk onder de wol kruipen. Alle linnen of katoen was uit den boze. Steeds moest de 'huidademing' (en dus 'ontgifting') optimaal kunnen verlopen. Daarnaast moest men zich uiteraard ook zo gezond mogelijk voeden en met open venster slapen, ook in de winter.

De theorie werd enthousiast onthaald, vooral in Duitsland en in Engeland. In 1884 werd in Londen een eerste winkel geopend die (vooral) onderkledij verkocht volgens 'Dr. Jaeger's Sanitary Woollen System'. Onder andere Oscar Wilde en George Bernard Shaw waren Jaegeradepten en ijverige propagandisten. Ook bij ons werd "le linge de corps d'après le système Jaeger" verkocht in gespecialiseerde winkels gevestigd in de prestigieuze winkelstraten. De firma Jaeger kende enkele moeilijke perioden, maar ze is nog steeds actief. Alleen de medische claims werden sterk afgezwakt of naar de geschiedenis verwezen.

De vraag kan gesteld worden of Dr. Jaeger, een medicus die in de diergeneeskunde en zoölogie belandde, door zelotisme (geloofsijver van pasbekeerden) tot die dierlijke vezeltheorie kwam ...

Luc Devriese