

[54] URETHRAL SHUNT TUBE IMPLANT

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128/350 R
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[58] Field of Search 3/1, DIG. 1; 128/334 R,
128/334 C, 348, 350 R, 349 R, 350 V

[56] References Cited

UNITED STATES PATENTS			
3,155,095	11/1964	Brown	128/334 C
3,633,585	1/1972	McDonald	128/348
3,783,454	1/1974	Sausse et al.	3/1
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Attorney, Agent, or Firm—John R. Walker, III

[57] ABSTRACT

A tubular implant for surgically bypassing the distal portion of the natural urethral tract to relieve urethral obstruction of certain animals, e.g., particularly cats and more particularly male cats. The implant includes a flexible tube having an interior end for attachment to the severed end of the urethra and an exterior end protruding outwardly from the body of the animal and being communicated with the interior end, thus providing a new passageway for the animal to pass fluids discharged by the kidneys. The implant includes a first patch for engaging the internal side of the dermal layer of the animal and being attached thereto, as with sutures. The tube extends through an aperture provided in the first patch with the first patch and the tube being fixedly attached one to the other by an adhesive. The implant also includes a second patch for engaging the outer wall of the urethra and which is attached to the urethra, as with sutures. The tube also extends through an aperture provided in the second patch with the second patch and the tube being fixedly attached one to the other by an adhesive.

2 Claims, 3 Drawing Figures

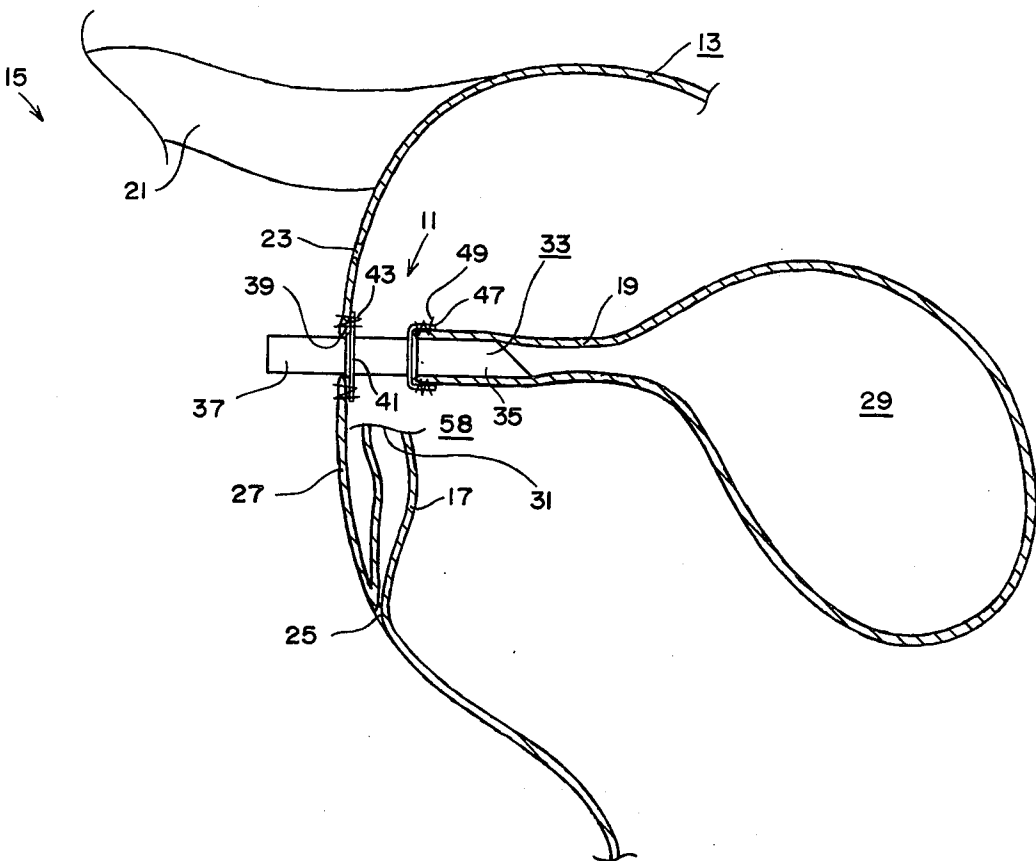


FIG. 1

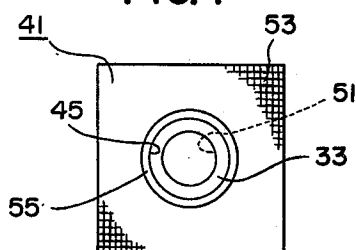


FIG. 2

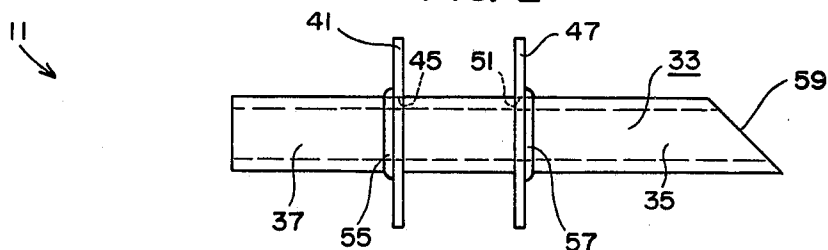
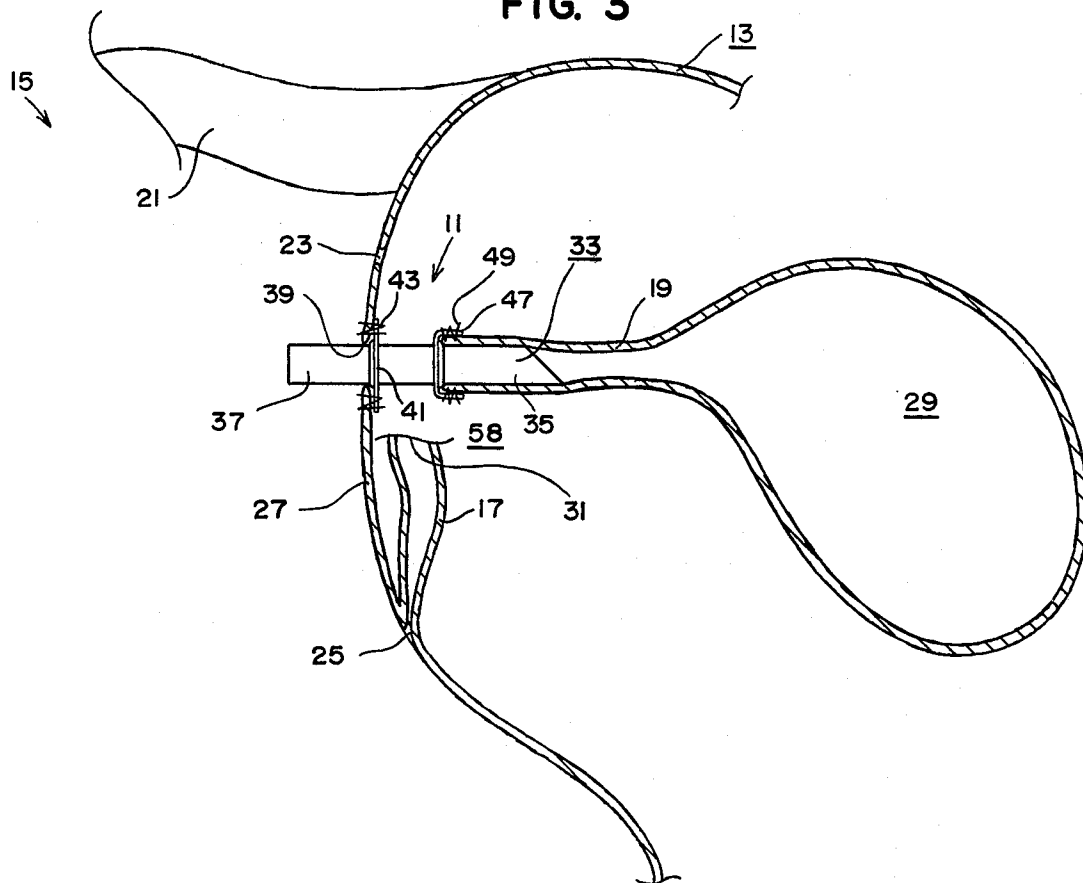


FIG. 3



URETHRAL SHUNT TUBE IMPLANT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of surgical implants and is particularly directed towards implants for shunting the distal end of the natural urethral tract.

2. Description of the Prior Art

Applicant believes that the implant herein disclosed is a totally new aid to the veterinary surgeon for urethroplasty-surgical intervention. In other words, applicant does not know of any prior urethral shunt tube implants. However, the state of the prior art known to the applicant is as follows: One basic surgical technique previously describing urethral bypass has been reported by M. Gregory Carbone, D.V.M. in an article entitled "Perineal Urethrostomy to Relieve Urethral Obstruction in the Male Cat" published in J.A.V.M.A., Vol. 143, No. 1, July 1, 1963, pp. 34-39. The following is a quote from the above-mentioned reference:

IN MOST CASES of recurrent urethral obstruction in the male or neutered cat, the obstructing plug of sabulous calculi can be dislodged by 'milking' the penis, by catheterization or by retrograde flushing through a lacrimal duct cannula. After urethral patency is established, recurrence can frequently be prevented by eliminating urinary infection, acidifying the urine, and feeding a meat diet with added salt. In some of the more stubborn cases, slitting the dorsum of the distal portion of the penis may prevent recurrence. In addition to these routine, treatments, estrogens, androgens, corticosteroids, diuretics, aspirin and many other drugs have been employed. Bladder flushing with acids, oils, solutions, suspensions, and emulsions has also been used as therapy.

Despite all these measures, there are still cats in which obstruction will recur repeatedly. In these cases the choice is euthanasia or surgical intervention. Several surgical operations have been suggested. A procedure that seemed promising was the antepubic urethrostomy, in which the urethra is joined to the skin of the abdomen. In my own experience, results have not been satisfactory. There was usually urine soilage and chronic dermatitis around the stoma. Most of these cats had recurrent cystitis which required almost constant antibacterial therapy. Some dribbled urine while jumping or running.

A 2nd operation to correct this condition is urethrocolostomy, in which the urethra is joined to the colon. This procedure resulted in frequent passage of soft feces. Ascending cystitis was an invariable sequel.

A 3rd approach is the splitting of the penile urethra through most of its length up to the ischial arch. The incised urethra is then held open by sutures to the surrounding skin or can be allowed to heal as an open wound. Severe stricture usually resulted, which is characteristic of healing involving the cavernous tissue of the penis.

Perineal Urethrostomy

In the technique to be described, the urethra is severed at the distal end of its membranous portion, proximal to the corpus cavernosum urethrae of the penis. Most of the urethra is preserved, including all of the portion surrounded by the compressor

urethrae membranaceae muscle, so that, as much as possible, the physiologic integrity and normal position of the urethra remain. This technique avoids the erectile tissue of the penis which is so prone to stricture.

Surgical Technique—...the skin is incised along the midline from the periphery of the anal ring to the ischium....

By dissecting forward, the thin, vertical bands of muscle in the median plane, the rectocavernosus and the caudocavernosus, are exposed and transected. By careful blunt dissection, using tenotomy scissors, the base of the penis and the bulbourethral glands are exposed, and immediately anterior to these, the membranous portion of the urethra.... This portion of the urethra is freed from the adjacent tissues. The bulbourethral glands are trimmed away to make separation easier. The urethra is transected just anterior to the glands.... The cut edge of the urethra is grasped with mosquito forceps to prevent it from retracting anteriorly from sight.

...Each end of the skin incision is closed...so that a 5 mm. gap remains at mid-incision over the urethra. At this gap, a semicircle is excised from each lip so that a circular hole about 5 mm. in diameter remains....

The urethra is grasped with eye dressing forceps and with the tapered eye needle. Then a continuous suture of 6-0 nylon is placed, joining the circumference of the urethra to the circular margins incised in the skin....

In other words, the technique above described by Dr. Carbone enables the fluids elaborated by the kidneys to pass outwardly from the body of the animal through an incision provided therein, i.e., the severed end of the urethra being joined to the margins of the incision. A particular problem with the Dr. Carbone technique is that the healing process of the severed tissue often results in the incision and the severed end of the urethra healing or growing together which introduces postoperative urine blockage or the same problem but a different cause.

Applicant originally believed the obvious solution was to design an interface tube that could be slipped into the severed end of the urethra to remain in place during the healing process and which could simply be withdrawn from the urethra after the healing was complete. However, it was soon discovered that if the medical practitioner could take the tube out after the healing process, the cat could and would remove the tube before completion of the healing process, thus obviating the solution to the problem.

A preliminary patentability search revealed the following U.S. Patents none of which pertain to the problem herein disclosed or reveal applicant's device. Long Pat. No. 1,642,819; Graham Pat. No. 2,586,940; Wallace Pat. No. 2,667,875; Kettenback Pat. No. 3,433,227; Zeman Pat. No. 3,540,451; Cohen Pat. No. 3,592,197; McDonald Pat. No. 3,633,585; Lee et al. Pat. No. 3,663,965; and McFarlane Pat. No. 3,682,180.

SUMMARY OF THE INVENTION

The concept of the present invention is to provide a urethral shunt tube implant for surgically bypassing the distal portion of the natural urethral tract to relieve

urethral obstruction of certain animals, e.g., particularly cats and more particularly male cats. The basic surgical technique advocated for placing the implant of the present invention is somewhat similar to the above-described technique developed by Dr. Carbone. The implant includes a flexible tube having an interior end for attachment to the severed end of the urethra and an exterior end protruding outwardly through an incision a predetermined distance from the body of the animal and being communicated with the interior end thereof, thus providing a new passageway for the animal to pass fluids discharged from the kidneys, in other words, obviating the likelihood of the severed end of the urethra and the incision growing together as above described.

The implant of the present invention includes a first patch for engaging the internal side of the dermal layer of the animal and is attached thereto, as with sutures. The tube extends through an aperture provided in the first patch with the first patch and the tube being fixedly attached one to the other, as by an adhesive, thus obviating the likelihood of the animal removing the implant.

The implant of the present invention also includes a second patch for engaging the outer wall of the urethra and which is attached to the severed urethra, as with sutures, thus obviating the possibility of the urethra involuntarily retracting anteriorly from sight, i.e., into the bladder. The tube also extends through an aperture provided in the second patch with the second patch and the tube also being fixedly attached one to the other, as by an adhesive.

Suturing the second patch to the urethra also positions the tube at the correct angle with the urethra, so that, as much as possible, the physiologic integrity and normal position of the urethra remain. Since most of the urethra is preserved, including all of the portion surrounded by the compressor urethrae membranaceae muscle, the animal is able to voluntarily exercise control over emptying its bladder.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an end elevational view of the implant of the present invention with a portion thereof depicting the mesh fabric used to form a certain structure thereof.

FIG. 2 is a side elevational view of the implant of the present invention.

FIG. 3 is a somewhat diagrammatic view of the posterior of a cat with the view being taken along a vertical center line and showing the implant of the present invention in place or bypassing the distal portion of the natural urethral tract.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The urethral shunt tube implant 11 of the present invention is intended to be surgically placed in the posterior 13, of certain animals, e.g., particularly cats and more particularly male cats, as character referenced herein by the numeral 15. The implant 11 is for bypassing the distal portion 17, of the natural urethral tract characterized by the numeral 19, thus relieving urethral obstruction of the animal 15. In order to readily gain an understanding of the implant 11 it will be advantageous to briefly discuss the anatomy of a particular animal 15. Accordingly, the animal 15 hereinafter may be referred to as a cat and more particularly to a male cat. However, it should be understood that the im-

plant 11 herein disclosed should not be limited to a cat or to either sex of the animal 15.

The posterior 13 of the cat 15 as shown in FIG. 3 of the drawing includes a tail 21, an anus 23, a penis 25, a dermal layer of skin 27, and a bladder 29 having the urethra 19 leading outwardly therefrom, i.e., the natural urethra 19 is shown severed as at 31 with mid portion (not shown) being amputated, thus leaving the distal portion 17 substantially undisturbed, or if desired it may be vindicated. It will be appreciated by those skilled in the art that certain anatomical structure has been deleted for simplicity and clarity, e.g., bulbourethral gland, compressor urethrae membranaceae muscle surrounding the urethra 19, rectocavernosus muscle, bulbocavernosus muscle, ischiocavernosus muscle, pubic symphysis, and prostate gland etc.

Also, in the interest of simplicity it is believed to be advantageous to describe the implant 11 in place as shown in FIG. 3 of the drawing. However, the following description will definitely disclose the structure depicted in FIGS. 1 and 2 of the drawing. The implant 11 includes a flexible tube 33 having an interior open end 35 extending internally of the cat 15 and communicated with an exterior open end 37 protruding outwardly from the body, or the posterior 13 thereof, through an incision, as at 39, provided in the dermal layer of skin 27, i.e., the incision 39 being substantially midway between the anus 23 and the penis 25.

The implant 11 also includes a first flexible patch 41 for engaging the dermal layer 27 of the animal 15 or more specifically the underneath surface of the dermal layer 27 as shown in FIG. 3 of the drawing. Also included is first suture means 43 for attaching the first patch 41 to the dermal layer 27. The first suture means 43 also closes the incision area, as at 39. The first suture means 43 preferably is stainless steel wire to prevent the cat from licking and reopening the wound.

The first patch 41 is provided with an aperture 45 centrally thereof and receives the tube 33 therethrough as clearly shown in FIG. 2 of the drawing. The first patch 41 is disposed adjacent the exterior end 37 of the tube 33 and is attached thereto in a manner yet to be described.

The implant 11 also includes a second flexible patch 47 which engages the outer wall of the urethra 19 adjacent the severed end thereof as clearly shown in FIG. 3 of the drawing. Also included is second suture means 49 for attaching the second patch 47 to the outer wall of the severed end of the urethra 19. The second suture means 49 preferably is of the well-known urological 3/0 surgical silk type.

The second flexible patch 47 is provided with an aperture 51 centrally thereof and receives the tube 33 therethrough, i.e., the aperture 51 in FIG. 1 of the drawing is in alignment with the aperture 45 in that figure.

The second patch 47 is disposed intermediate the ends of the flexible tube 33 and is attached thereto in a manner yet to be disclosed. The open interior end of the tube 33 is received within the severed end of the urethra 19 to communicate the bladder 29 with the open exterior end 37, thus providing a new passageway for the cat 15 to pass fluids discharged by the kidneys (now shown). (not

The flexible tube 33 and the first and second patches 41, 47 are preferably selected from a substance which is compatible with and resistant to attack by animal

body fluids. More specifically, the first and second patches preferably are formed from a mesh fabric, as at 53, which preferably is impregnated with a silicone-elastomer, i.e., a material which is available in commerce under the trademark "Silastic", made by Dow Corning Corporation. Further, the mesh fabric 53 preferably is polyethylene terephthalate, available in commerce under the trademark "Dacron", made by E. I. duPont de Nemours and Company. It should be understood that other substances are suitable for the first and second patches 41, 47, e.g., polymerized tetrafluoroethylene, available in commerce under the trademark "Teflon", made by E. I. duPont de Nemours and Company.

Further, the flexible tube 33 preferably is formed from the above-described Silastic or silicone-elastomer.

It should be pointed out that animal tissue has an inherent tendency to attach itself or grow to the above-described mesh fabric 53. Thus the device 11 is better implanted in the body of the cat 15. Additionally, the above-described mesh fabric 53 provides reinforcement or strength to the first and second patches 41, 47, thus obviating the likelihood of the cat 15 tearing the stitches, shown by the first and second sutures 43, 49.

The implant 11 includes silicone adhesive means, as at 55, 57 for fixedly attaching the first and second mesh patches 41, 47 respectively to the flexible tube 33. Further, the adhesive means 55, 57 establishes washer-like seal means for sealable engagement with certain portions of the animal, e.g., the severed end of the urethra 19 abuttingly engages the adhesive means 57, in a manner somewhat similar to well-known garden hose washers, to seal the urethra 19 from without. This seal aids in preventing urine from leaking into the perineal cavity, as at 58. Also, the adhesive means 55 sealably engages the dermal layer of skin 27 in a similar manner.

The outside diameter of the flexible tube 33 preferably has a predetermined dimension so as to sealably engage the inner wall of the urethra 19, e.g., the inside diameter of the urethra of the cat 15 is normally 4.7 mm. and the preferred outside diameter of the flexible tube 33 is a nominal 4.9 mm. This tight fit also aids in preventing urine from leaking into the perineal cavity 58.

The adhesive means 55, 57 preferably is of a substance which is compatible with and resistant to attack by animal body fluids, e.g., well-known medical grade silicone adhesive.

The interior end 35 of the tube 33 preferably is beveled as at 59 to facilitate insertion of the tube 33 into the severed end of the urethra 19. The bevel 59 also obviates recurrence of the urethra obstruction immediately adjacent to the interior end 35 by directing any such obstructing particles which may be present in the urethra 19 towards the exterior open end 37.

However, it is conceivable that postoperative blockage may develop in the urethra 19. Accordingly, the tube 33 preferably has a predetermined inside diameter to facilitate freely passing a common catheter tube (not shown) into the bladder 29 to dislodge any obstruction. In this regard, the inside diameter of the flexible tube 33 preferably is 2.6 mm., a dimension which closely approximates the inside diameter of the distal portion 17 of the urethra.

The tube 33 has a predetermined length from the second patch 47 to the interior end 35, or the bevel 59, to assure optimum engagement with the urethra 19. More

specifically, this length is critical since if the tube 33 extends into the bladder 29 the cat 15 would have no bladder control, i.e., the bevel 59 must terminate a predetermined distance from the bladder 29 so that a portion of the urethra 19 remains unobstructed by the tube 33 so that the compressor urethrae membranaceae muscle surrounding the urethra may be voluntarily exercised to squeeze or close off the bladder 29. Accordingly, the distance from the second patch 47 to the tip of the bevel 59 preferably is 19.1 mm.

The first and second patches 41, 47 have a predetermined spaced apart distance to assure optimum positioning of the severed end of the urethra 19. More specifically, the distance between the first and second patches 41, 47 preferably is 6.5 mm.

The tube 33 has a predetermined length between the first patch 41 and the exterior open end to preclude the incision 39 from healingly closing the opening of the exterior end 37. Additionally, the exterior end 37 preferably protrudes outwardly from the dermal layer of skin 27 a predetermined distance to obviate urine dripping on the incision 39 during the healing process. Accordingly, the length of the tube 33 from the first patch 31 to the exterior end preferably is 12.5 mm. when surgically placed. However, the protruding end can be clipped off closer to the dermal layer 27 subsequent to the incision 39 completely healing, i.e., to approximately 6 mm. or the like.

It should also be mentioned that in the event the distance between the second patch 47 and the bevel 59 is too short there is a strong possibility of urethral obstruction reoccurring in the excess length of the urethra 19.

It will be obvious to those skilled in the art that the implant 11 is intended to be implanted by a suitably skilled medical practitioner by first suturing the second patch 47 to the severed end of the urethra 19 and subsequently suturing the first patch 41 to the dermal layer 27.

Although the invention has been described and illustrated with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications may be made therein which are within the full intended scope of the invention.

I claim:

1. A surgical implant for bypassing the distal portion of the natural urethra tract to relieve urethral obstruction of certain animals, said implant comprising a tube having an interior open end communicated with an exterior open end, a first flexible patch extending radially outwardly from said tube for attachment to the dermal layer of the animal, said first patch being provided with an aperture centrally thereof and receiving said tube therethrough, said first patch being attached to said tube adjacent said exterior end thereof, a second flexible patch extending radially outwardly from said tube for attachment to the severed end of the urethra of the animal, said second patch being provided with an aperture centrally thereof and receiving said tube therethrough, said second patch being attached to said tube intermediate the ends thereof, said interior open end of said tube being adapted for receiving the severed end of the urethra to communicate the bladder of the animal with said exterior open end of said tube, and said flexible tube and said first and second patches being compatible with and resistant to attack by animal body fluids, said first and second patches being formed from

silicone impregnated Dacron mesh fabric, said tube being formed from silicone-elastomer, silicone adhesive means for fixedly attaching said first and second mesh patches to said tube, said adhesive means additionally establishing washerlike seal means for sealable engagement with certain portions of the animal abuttingly engaging said adhesive means.

2. A surgical implant for bypassing the distal portion of the natural urethra tract to relieve urethral obstruction of certain animals, said implant comprising a flexible tube having a beveled interior open end communicated with an exterior open end, a first flexible patch extending radially outwardly of said tube for attachment to the dermal layer of the animal, said first patch being provided with an aperture centrally thereof and receiving said tube therethrough, first silicone adhesive means for fixedly attaching said first patch to said tube adjacent said exterior end thereof, said first silicone adhesive means establishing washerlike seal means for sealable engagement with the dermal layer of the animal, a second flexible patch extending radially out-

wardly of said tube for attachment to the severed end of the urethra of the animal, said second patch being provided with an aperture centrally thereof and receiving said tube therethrough, second silicone adhesive means for fixedly attaching said first patch to said tube intermediate the ends thereof, said second silicone adhesive means establishing washerlike seal means for sealable engagement with the severed end of the urethra of the animal, said beveled interior end of said tube facilitating insertion of said implant into the severed end of the urethra to communicate the bladder of the animal with said exterior open end of said tube, said tube having a predetermined length from said second patch to said beveled interior end thereof to assure optimum engagement with the urethra of the animal, said first and second patches having a predetermined spaced apart distance to assure optimum positioning of the severed end of the urethra, and said first and second patches being compatible with and resistant to attack by animal body fluids.

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