

Surgical conditions and requested procedures for ruminants and small animals handled at the College of Veterinary Medicine and Agriculture clinic, Debre Zeit, Ethiopia: A retrospective study 1999-2007

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Abstract

The surgical conditions and requested procedures encountered in ruminants and small animals were surveyed using the available clinical records of the veterinary clinic of the college and personal record book from December 1999 to December 2007 in order to document and compare their prevalence's. Of the total 689 surgical conditions and requested procedures cattle, sheep, goat, dog and cat, accounted for 368 (53.48%), 148 (21.51%), 16 (2.32%), 133 (19.33%), and 23 (3.34%), respectively. The distribution of the surgical cases based on sex indicated that male cases predominate in cattle 278 (75.54%) and sheep 86 (58.10%). On the other hand, in dogs, cats and goats female cases predominate with 78 (58.64%), 16 (69.56%) and 10 (62.5%), respectively. The frequent surgical condition of male cattle according to their frequency of occurrence were abscess 64 (23.02%), wound 53 (19.06%), urethral obstruction 45 (16.18%), horn fracture 40 (14.38%) and penile and/preputial injuries 34 (12.23%). In female cattle, the common surgical conditions were wound 25 (27.77%), local abscess 17 (18.88%), horn fracture 12 (13.33%) and hoof overgrowth 12 (13.33%). In male sheep urethral obstruction accounted for 28 (32.55%) of the cases followed by penile and or preputial injuries 15 (17.44%), wound 13 (15.11%) and traumatic hernia 10 (10.41%). Cases of dystocia were recorded in 33 (20.12%) and 5 (50%) of the female sheep and goats, respectively. The common reasons for male dog to be brought to the clinic were for sterilization 12 (21.81%), wound treatment 10 (18.18%) and aural hematoma 8 (14.54%). On the other hand, request for sterilization 45 (57.69%) and difficulty of parturition 16 (20.51%) were common reason for bitch to be brought to the clinic. The two main reasons for female cats to be presented to the clinic were difficulty of parturition 10 (62.5%) and request for sterilization 5 (31.25%). A concise description of intervention procedures is provided on the two common surgical problems of cattle (wound, urethral obstruction) and sheep (urethral obstruction).

Keywords: Abscess, dystocia, surgical conditions, urethral obstruction, Veterinary Teaching Clinic

Introduction

Veterinary services in Africa have been encouraged by the Food and Agricultural Organization (FAO) and World health organization (WHO) but both lay emphasis on food animal production, veterinary public health and preventive medicine (Heendon, 1989). Similarly, in Ethiopia, treatment of individual sick animal gets less attention until recent years as the policy and man power resource give more attention to preventive medicine. This has contributed to low level of infrastructure for veterinary practice as well as research in medical as well as surgical disease of domestic animals. However, recently there is an increase demand for better veterinary services due to the increasing awareness of the importance of treatment of individual animal by both the rural and urban community. A growing trend of keeping pure or crossbred animals as companion pets (esp. dog) in urban areas also contributed to the increased demand in the veterinary care of individual animal. Due to the above mentioned facts and as part of the learning-teaching process veterinary teaching clinics/hospitals are working on both farm and small animals where the treatment of those animals is undertaken. The College of Veterinary Medicine and Agriculture clinic of the Addis Ababa University, in addition to its teaching mission and as part of its community service activity provide veterinary clinical service to farm and companion animals for various types of health disorders. Surgical treatment whether elective or emergency, is a constant practice. Retrospective epidemiological studies provide useful information on disease patterns that could be used in prevention and policy formulation for future management of the prevalent diseases studied. In view of this, few works were conducted in the veterinary clinics using past records. Retrospective case analyses were conducted at Debre Ziet and Gondar veterinary schools on ruminant urethral obstruction and rumen plastic foreign bodies, respectively (Roman Tiruneh, 2000; Ramaswamy and Rai Sharma, 2012). The objective of this retrospective study is thus, to document and compare the prevalence and distribution pattern of surgical diseases and requested procedures among ruminants and small animals, to identify common surgical conditions in domestic animals and provide concise description of intervention procedures of selected cases. This work may benefit researchers, veterinary practitioners and other animal health workers.

Materials and methods

The case files of ruminants and small animals from the clinical case record book of the College of Veterinary Medicine and Agriculture clinic and personal case record book were used to retrospectively assess the distribution pattern of surgical cases and requested procedures handled from December 1999 to December 2007. Analysis of the surgical conditions and requested procedures were made in regard to species, sex, type of condition or requested procedures. Percentage distribution were determined and presented in tabular form. Cases of donkeys, horses and mules were not included in this study as they were handled by the clinics of Donkey Sanctuary, and Society for the Protection of Animals Abroad (SPANNA), Ethiopia, respectively. Ruminants presented for bloodless castration were not also included in this study.

Results

A total of 689 surgical conditions and requested procedures were recorded during the nine year period of this study (Table 1).

Table 1. Number of recorded surgical cases handled at the clinic of College of Veterinary Medicine and Agriculture, AAU during 1999-2007.

Year	Cat	Cattle	Dog	Goat	Sheep	Total
1999	1	5	11	0	11	29
2000	2	30	18	1	12	63
2001	0	3	3	1	1	8
2002	0	24	5	0	9	38
2003	0	14	7	1	10	32
2004	2	34	20	1	22	79
2005	12	122	36	7	47	224
2006	2	93	17	1	28	141
2007	4	43	16	4	9	76
Total	23	368	133	16	149	689
Percentage distribution	3.34%	53.48%	19.33%	2.32%	21.62%	100%

The above percentage distribution of surgical cases according to species showed cattle with the highest number followed by sheep, dogs, cats and goats. The distribution of the surgical cases based on sex indicated that male cases predominate in cattle and sheep with 278 (75.54%) and 86 (58.10%), respectively. On the other hand, in dogs, cats and goats female cases predominate with 78 (58.64%), 16 (69.56%) and 10 (62.5%), respectively (Table 2).

Table 2. Distribution of surgical cases and requested procedures among species and sex handled at the clinic of College of Veterinary Medicine and Agriculture, AAU (1999-2007)

Species	No. of surgical cases	Sex	
		M	F
Cattle	368	278 (75.54%)	90 (24.45%)
Sheep	149	86 (58.10%)	63 (42.28%)
Dog	133	55 (41.35%)	78 (58.64%)
Cat	23	7 (30.43%)	16 (69.56%)
Goat	16	6 (37.5%)	10 (62.5%)
Total	689	432 (63.86)	257 (36.14)

The common surgical conditions in male cattle according to their frequency of occurrence were abscesses, wounds, urethral obstructions, horn fractures and penile and/or preputial. In female cattle, the frequent surgical conditions were wounds, local abscesses, horn fractures and hoof overgrowth (Table 3).

Table 3. Surgical conditions and their interventions in cattle presented at the clinic of College of Veterinary Medicine and Agriculture, AAU (1999-2007)

Surgical Condition	Intervention/ treatment	Sex		Total number of cases
		M	F	
Abscess	Lancing abscess	64 (23.02%)	14(15.55)	78 (21.19)
Abnormal horn growth	Dehorning using dehorning saw	0	2(2.22%)	2 (0.54%)
Hematoma	Drainage of the hematoma	2 (0.71%)	0	2(0.54%)
Horn fracture	Dehorning by dehorning wire	40 (14.38%)	10 (11.11)	50 (13.58%)
Naval ill	Drainage of abscess and hernia repair	4 (1.43%)	0	4 (1.08%)
Penile and or preputial injuries	Correction of the disorder	34 (12.23%)	0	34 (9.23%)
Ocular tumor	Extirpation of the eye ball	11 (3.95%)	1(1.11%)	12 (3.26%)
Ocular injury	Eye enucleation	8 (2.87%)	0	8(2.17%)
Orchitis	Open castration	4 (1.43%)	0	4(1.08%)
Skin tumor	Tumor excision	6 (2.15%)	2 (2.22%)	8 (2.17%)

Surgical Condition	Intervention/ treatment	Sex		Total number of cases
		M	F	
Tail gangrene	Removal of the tail/ docking	3 (1.07%)	0	3 (1.90%)
Testicular tumor	Open castration	1(0.35%)	0	1(0.27%)
Urethral obstruction	Urethrostomy or urethrotomy	45 (16.18%)	0	45 (12.22%)
Traumatic hernia	Surgical repair of hernia	5 (1.79%)	2 (2.22%)	7(1.90%)
Umbilical hernia	Surgical repair of hernia	0	1(1.11%)	1(0.27%)
Wound/traumatic	Open wound management or primary closure	53 (19.06%)	25 (27.77%)	78 (21.19%)
Congenital urethral obstruction	Correction of the defect	0	1(1.11%)	1(0.27%)
Dystocia	C-section	0	5 (5.55)	5(1.35%)
Dermoid cyst	No treatment was made	0	1(1.11%)	1(0.27%)
Esophageal obstruction	Foreign body retrieved from cervical esophagus	0	1(1.11%)	1(0.27%)
Hoof overgrowth	Hoof trimming	0	12 (13.33%)	12 (3.26%)
Rumen foreign body	Rumenotomy and foreign body removal	0	1(1.11%)	1(0.27%)
Utrine prolapse	Manual correction of prolapse	0	5 (5.55%)	5(1.35%)
Vaginal prolapse	Manual correction of prolapse and/ or vaginal amputation	0	7(7.77%)	7(1.90%)
Total		278	90	368

The most frequent surgical problems of male sheep were urethral obstruction followed by penile and or preputial injuries, wound and ventral or ventro-lateral rupture. Dystocia was recorded in 33 (20.12%) and 5 (50%) of the female sheep and goats, respectively. Other common surgical conditions of female sheep were wound and traumatic hernia (Table 4).

Table 4. Surgical conditions and their interventions in sheep and goats presented at the clinic of College of Veterinary Medicine and Agriculture, AAU (1999-2007)

Surgical Condition	Intervention/treatment	sheep		goats		Total number of cases
		Sex		Sex		
		M	F	M	F	
Abscess	Lancing abscess	3(3.48%)	4	-	-	7(4.24%)
Dystocia	C-section	-	28 (45.16%)	-	5 (50%)	33(20%)
Horn fracture	dehorning	3(3.48%)		-	1(10%)	4(2.42%)
Rumen foreign body	rumenotomy	-	5(7.93%)	-	2(20%)	7(4.24%)
Prolapse of the uterus	Correction of prolapse		2(3.17%)	-		2(1.21%)
Traumatic wound	Open wound management or wound repair by primary closure	13 (15.11%)	14 (22.58%)	-	2(20%)	29(17.57%)
Umbilical hernia	Hernial repair	-	1(1.58%)	-	-	1(0.60%)
Traumatic hernia	Hernial repair	10 (10.41%)	8 (12.90%)	-	-	18(10.90%)
Atresia ani	Correction of the defect	2(2.32%)		-	-	2(1.21%)
Abnormal horn growth	dehorning	3(3.48%)		-	-	3(1.81%)
Hematoma	Drainage of the hematoma	2(2.32%)				2(1.21%)
Penile and or preputial injuries	Correction of the disorder	15 (17.44%)		2(33.33%)		17(10.30%)
Ocular injury	Enucleation of the eye ball	4(4.65%)		2(33.33%)		6(3.63%)
Orchitis	Open castration	3(3.48%)		-		3(1.81%)
Urethral obstruction	Urethral process amputation or urethrostomy	28 (32.55%)		2(33.33%)		30 (18.18%)
Total		86	63	6	10	165

The two main reasons for female cats to be brought to the clinic were difficulty of parturition 10 (62.5%) and request for sterilization 5 (31.25%).

Table 5. Surgical conditions and requested procedures in cats presented at the clinic of College of Veterinary Medicine and Agriculture, AAU (1999-2007)

Surgical conditions or requested procedures	Intervention/treatment	Sex		Total number of cases
		M	F	
Request for sterilization	Castration/Ovariohysterectomy	1(14.28%)	5 (31.25%)	6(26.08%)
Dislocation (tibio-tarsal joint) and fracture (tibia)	Fracture repair by external coaptation	2(28.57%)	-	2(8.69%)
Dystocia	C-section	-	10 (62.5%)	10(43.47%)
Evisceration (trauma) and wounds	Wound repair	3(42.85%)	0	3(13.04%)
Rectal prolapse	Manual correction of the prolapse	-	1(6.25%)	1(4.34%)
Urethral obstruction	Removal of urethral plug	1(14.28%)	-	1(4.34%)
Total	7	16	23	

The frequent reasons for male dog to be brought to the clinic were for sterilization 12 (21.81%), wound 10 (18.18%) and aural hematoma 8 (14.54%). On the other hand, request for sterilization 45 (57.69%) and difficulty of parturition 16 (20.51%) were common reason for bitch to be presented for treatment.

Table 6. Surgical conditions and requested procedures in dogs presented at the clinic of College of Veterinary Medicine and Agriculture, AAU (1999-2007)

Surgical conditions or requested procedures	Intervention/treatment	Sex		Total number of cases
		M	F	
Aural hematoma	Surgical removal of hematoma	8 (14.54%)	2(2.56%)	10(7.51%)
Request for Sterilization	castration/Ovario-hysterectomy	12 (21.81%)	45 (57.69%)	57(42.85%)
Dog bite wound	Open wound management and or delayed primary closure	4 (7.27%)	2(2.56%)	6(4.51%)
Wound/traumatic	Open wound management or primary closure	10 (18.18%)	-	10(7.51%)
Dental caries	tooth extraction	1(1.81%)	-	1(0.75%)

Surgical conditions or requested procedures	Intervention/treatment	Sex		Total number of cases
		M	F	
Fracture	Fracture repair by external coaptation	2(3.63%)	-	2(1.50%)
Ocular trauma	Eye enucleation	7(12.72%)	-	7(5.26%)
Penile tumor	tumor excision	1(1.81%)	-	1(0.75%)
Perineal hernia	Hernial repair	2(3.63%)	-	2(1.50%)
Prostatic hyperplasia	Open castration	2(3.63%)	-	2(1.50%)
Rectal foreign body	Manual removal of foreign body	1(1.81%)	-	1(0.75%)
Skin tumor	Tumor excision	4 (7.27%)	2(2.56%)	6(4.51%)
Testicular tumor	Open castration	1(1.81%)	-	1(0.75%)
Dystocia	C-section	-	16 (20.51%)	16(12.03%)
Esophageal obstruction	Foreign body removed by esophagotomy	-	1(1.28%)	1(0.75%)
Mammary gland tumor	Mastectomy of the affected mammary glands and those connected with venous supply and lymphatic drainage	-	4(5.12%)	4(3%)
Third eyelid prolapse	Excision of the third eyelid	-	1(1.28%)	1(0.75%)
Vaginal prolapse	Manual replacement of the prolapse	-	1(1.28%)	1(0.75%)
Vaginal tumor	Excision of vaginal tumor	-	3(3.84%)	3(2.25%)
Traumatic hernia	Hernial repair	-	1(1.28%)	1(0.75%)
Total	55	78	133	

Discussion

This study provides preliminary information on the prevalence of surgical diseases of both ruminants and small animal species in and around Debre Ziet area of Ethiopia. Although a large number of farm and companion animals

receive treatments every year for various health disorders in the clinic, the trend in the number of surgical conditions recorded is variable from year to year. This can be generally attributed to poor record keeping of the clinic case files. The high prevalence of surgical conditions in cattle is explained by the predominance of cattle farming as crop-livestock agriculture is the basic farming system and husbandry in the study area. Sheep are kept in a small-scale by both the urban and peri-urban dwellers in Debre Ziet and its surroundings as it is relatively cheaper to rear small ruminants where they are simply allowed to roam freely and scavenge for food and hence come next to cattle in the region. Contrary to the findings of this study, the distribution of surgical cases at the University of Nigeria Teaching Hospital showed that dogs and goats constituted the majority of cases presented for surgery (Eze, and Idowu, 2002). With regard to the sex distribution of animals, male cattle and sheep predominate. This is attributed by the high number of both species of animals presented to the clinic. The common surgical problems of male cattle were abscesses 64 (23.02%), wounds 53 (19.06%), urethral obstructions 45 (16.18%), horn fractures 40 (14.38%) and penile and or preputial injuries 34 (12.23%). On the other hand, in male sheep common surgical conditions were urethral obstruction 28 (32.55%), penile and or preputial abnormalities 15 (17.44%), wound 13 (15.11%) and traumatic hernia 10 (10.41%). Fighting, an innate behavior of male animals could be ascribed as the cause of most of the above mentioned conditions. Additionally, as oxen are used for draught purpose they are more prone to be affected by traumatic conditions than female of the same species. Study conducted in the area showed that urethral obstruction is one of the major surgical problems of male ruminants and one of the major causes was indicated to be external trauma (Roman Tiruneh, 2000).

In sheep, female reproductive cases predominate due to the fact that female are kept longer periods in the herd for breeding than the male. Higher incidence of dystocia 28 (45.16%) was observed in this study. The peculiarity of the female's vulnerability to gynecological and obstetrical conditions can be considered as contributing factors as stated by Aarthuer et. al, (1998). Similar findings were reported by Waziri, (2007). These findings were in conformity with the reports of Mohammed and Ahemed (1994). It is noted that cases of dystocia presented for surgical correction is more in sheep than in the cow. This is presumed to be due to the fact that manual correction of dystocia is difficult in sheep as compared to the cow. Traumatic hernia was common in both male and female sheep. In the area there is a tradition of keeping small ruminants and cattle in

the same barn during the night and this could predispose to kicking and horn thrust while they compete for space and feed.

Regarding small animal surgical cases, female cases predominate 78/133(58.64%). The reason for high prevalence of female dogs and cats was due to the fact that the majority of the cases were presented for sterilization and difficulty of parturition. The two common reasons for presentation of female dogs were request for sterilization 45 (57.69%) and dystocia 16 (20.51%). This finding might have been as the result of the usual higher attention paid to female reproduction. Similar findings were reported by Ajaia and Fayemi (2011).

The study showed that abscess and traumatic wounds in cattle and urethral obstruction in male cattle and sheep, were found to be predominant in the area. On the bases of this, a concise description of intervention procedures is provided on the two common surgical problems of cattle and sheep. The knowledge obtained will increase our understanding as to how to handle the mentioned surgical problems of ruminants.

Wound management principles

In veterinary medicine the commonly observed wounds include lacerations, avulsions, puncture and bite wounds. Abscess as a result of infection of traumatic wound is also frequent. To facilitate the healing process of traumatic wounds proper intervention procedures are required. The latest edition of the Merck Manual was used to describe the different wound management principles in this paper (Merck Manual, 2012).

The first step in wound management is assessment of the overall stability of the animal. After initial assessment, the animal should be stabilized. First aid for the wound should be performed as soon as safely possible. Active bleeding can be controlled by one of the suitable methods used for hemorrhage control.

The wound must be protected from further contamination or trauma by covering it with a sterile, dressing if the region allows bandaging. The delay between examination and definitive debridement should be minimized to decrease bacterial contamination. If the wound is infected, a sample should be collected for culture and sensitivity testing. Parenteral antibiotic therapy should be instituted in all cases of dirty, infected, or puncture wounds. A broad-spectrum

bactericidal antibiotic, is generally recommended pending culture results for all infected or puncture wounds.

Prior to the definitive treatment the two golden rules required are wound lavage and wound debridement. Irrigation of the wound washes away both visible and microscopic debris. This reduces the bacterial load in the tissue, which helps decrease wound complications. The ideal lavage fluid would be antiseptic and nontoxic to the healing tissues. Although isotonic saline is not antiseptic, it is the least toxic to healing tissue. Dilute antiseptics can be used safely. Chlorhexidine diacetate 0.05% has sustained residual activity against a broad spectrum of bacteria, while causing minimal tissue inflammation. Povidone-iodine 1% is an effective antiseptic, but it has minimal residual activity and may be inactivated by purulent debris. Hydrogen peroxide 1-2% solution is the best for puncture type of wounds as it provides aeration of deep wounds. After wound preparation and hair removal, debridement can be performed. Skin and local tissue viability should be assessed. Blue-black, leathery, thin, or white skin is signs associated with non-viability. Necrotic tissue should be sharply excised. The debridement may be done in layers or as one complete section of tissue. Tissues that have questionable viability or are associated with essential structures such as neurovascular bundles should be treated conservatively. In some instances staged debridement may be indicated.

Following initial inspection, lavage, and debridement, a decision must be made whether to close the wound or to manage it as an open wound. Considerations include the availability of skin for closure and the level of contamination or infection. Primary closure is the simplest method of wound management and it should be used only in ideal situations to avoid wound complications. Clean wounds that are properly debrided usually heal without complication. With a primary closure, the layers should be individually closed to minimize dead space that might contribute to seroma formation. The types of suture and suture patterns used depend on the size and location of the wound and the size of the animal. Primary closure may not be appropriate for a grossly contaminated or infected wound. Therefore, if closure is a suitable goal, it may be delayed until the contamination or infection is controlled. The wound can be managed on short-term basis as an open wound until it appears healthy. At that time, the wound can be safely closed with minimal risk of complications. The time between initial debridement and final closure vary according to the degree of contamination or infection. Minimally contaminated wounds may be closed after 24–72 hr. longer periods may be required for heavily infected wounds.

Wounds that are closed >5 days after the initial wounding are considered to be a secondary closure. This implies that granulation tissue has begun to form in the wound before closure.

Open wound management is appropriate when a wound cannot or should not be closed due to reasons such as loss of skin that makes closure impossible or those that are grossly contaminated. Closure of a grossly contaminated wound result in serious infection. Open wound management enables progressive debridement procedures although it increases cost, prolongs time for healing, and may create complications from wound contracture. Open wound management is based on repeated bandaging and debridement as needed until the wound heals.

Although the general principle is the same, treatment of specific type of wounds vary. The following are common type of traumatic wounds. Uncomplicated simple lacerations are usually managed by complete closure if they are not grossly contaminated. The wound should be thoroughly lavaged and debrided as necessary before closure. If tension is present on the wound edges, it should be relieved by tension-relieving techniques such as undermining and relaxation incisions. Deep lacerations may be treated according to the same principles, depending on the extent of the injury. Damage to underlying structures (eg, muscles, tendons, and blood vessels) must be resolved before closure. If a laceration is grossly contaminated with debris, primary closure of the wound may not be indicated. Contaminated wounds may be closed with drains or treated as an open wound.

Dog bites have a more varied presentation. Because of the slashing nature of dog bite injuries, the major tissue damage is usually found beneath the surface of the wound. While only small puncture marks or bruising may be evident on the surface, ribs may be broken or internal organs seriously damaged. The animal should be thoroughly examined and stabilized before definitive wound care is begun. The wound should be surgically extended as far as necessary to allow a thorough examination and determination of its extent before a decision on the repair can be made. After a proper assessment, debridement can be performed. Unless en bloc debridement is performed, complete wound closure is usually not recommended because the sites are usually contaminated. Closure can be accomplished with drains, as a delayed closure, or by second intention depending on the extent of the injury.

Avulsions result in an extensive loss of skin and a varied amount of deeper tissues. These injuries are a result of a shear force on the skin. Hyena bites frequently resulted in this type of wound. Avulsions frequently require marked and repeated debridement. Differentiating viable and nonviable tissue may be a problem in the early wound debridement process. An attempt should be made to salvage tissue in which viability is questionable. Subsequent debridement can be used to remove any necrotic tissue. Closure can be attempted if there is tissue loss is not great and contamination is minimal. Most cases are managed by open wound healing.

Puncture type of wounds, as it is caused mainly by sharp objects most of the damage is not visible. This type of wounds is always considered to be contaminated, and primary closure is generally not recommended. These wounds should be managed as open wounds or by delayed primary closure. After initial assessment and stabilization of the animal, the wound may be explored to evaluate the extent of damage and to determine a plan for repair.

Management of Urethral obstruction

Almost all cases require surgical intervention at some point during the treatment process although the long-term success is poor due to recurrence of obstruction and stricture formation. Fluid, and antibiotic therapies should be used in support of surgical intervention. Surgical technique may be chosen based on the type of clinical presentation of the case, site of obstruction, including location of the rupture, and value of the animal. The following are the different surgical techniques indicated by Makhdoomi D. M., and Mohsin A Gazi (2013) in the management of cases of urethral obstruction in cattle and sheep.

Urethrostomy is a surgical operation for the treatment of urethral obstruction and mainly useful for urethral rupture cases. The procedure can be performed with or without amputation of the penis and carried out in the perineum or in the ventral abdominal wall based on the site of obstruction.

i. Perineal Urethrostomy: It consists of making a permanent opening in the urethra, the lining mucous membrane of the urethra and the skin being joined by sutures when permanent diversion of urine flow proximal to an obstructed severely damaged or diseased urethra is required. The skin incision is carried few cm below the anal opening or at the base of the scrotum in the median raphe and accordingly, the name ischial and base of scrotum approach is given.

Ischial approach: it is selected because the procedure may be performed with animal in a standing position. Anesthesia of the operative site may be accomplished by an epidural block, or by local infiltration of the subcutis of the median raphe from just above the level of the tuber ischii and down ward. Blunt or sharp dissection is carried down through the septum between the animal's legs until the penis is identified. By blunt dissection and considerable manual traction, the penis is isolated and pulled outward through the incision. The penis is then severed at lower end of the incision, making certain that the proximal stump is long enough that it may be brought to the surface and protrude for at least 2.5cm. The urethra lies on the outer or dorsal surface of the penis as the stump is brought outside the incision in the skin. A simple method is to place sutures of braided nylon or other non-absorbable suture material through the skin of one side of the incision, then transfix the body of the penis; then the suture is brought through the skin of the opposite side of the incision. Care should be used not to transfix urethra, and the suture should be tied below the protruding portion of the penis so that the urethra is not ligated.

Base of scrotum approach: This site offers the advantage that the penis is more readily accessible and the urethra and penis are not bent or displaced to any appreciable degree when brought out to the skin surface. Therefore, unlike that of ischial approach this type will not have market discrimination. Anesthesia is best accomplished by local subcutaneous infiltration of the median raphe upward from the base of the scrotum for 15-20cm at skin incision site. Care should be taken not to enter the scrotal fat, as this makes identification of the penis difficult and retards healing. The penis is isolated by blunt dissection and manually pulled through the tissues out through skin incision. The penis is then severed at the proximal end of the sigmoid flexure and the proximal stump is then fixed to the skin in the same fashion as with the ischial approach.

ii. Urethrotomy: This procedure is mainly useful for early cases of urethral obstruction or in the absence of either urethral or bladder rupture. This procedure involves incision of the urethra to retrieve urinary calculi. Following removal the edges of the incised urethra are opposed to envelop the indwelling urinary catheter.

iii. Amputation of the urethral process: Removal of urolith is first attempted by application of digital pressure to milk-out the calculi through the urethral orifice. In the presence of difficulty to retrieve the calculi manual removal is achieved by cutting the urethral process at its base. Urethral process

amputation may provide a temporary correction of urethral obstruction, as recurrence of obstruction is likely

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