Introduction
Urolithiasis is the formation of calculi from less soluble crystalloids of urine as a result of acquired physiological and pathological changes. Urinary calculi which form in the urinary tract are major cause of urinary obstruction in male dogs (Defarges and Dunn, 2008). Mostly there will be a solitary calculus in urethra caudal to os penis or sometimes multiple small stones get lodged in urethra and trigon region of the urinary bladder. The present paper reports the successful surgical management of multiple urethral and cystic calculi in five dogs.

Case History and Observations
Case-1: A 4 years old Doberman was presented with a history of passing blood tinged urine since 10 days and there was complete cessation of urine since 24 hours.

Case-2: A 7 years old German Shepard was presented with a history of dribbling of urine since 4 days and inability to pass urine for the last two days.

Case-3: A 4½ years old Doberman was presented with a history of inability to pass urine freely since 10 days and passage of a few drops of blood mixed urine since 12 hours.

Case-4: A 6 years old Alsatian was presented with a history of dribbling of urine with blood since last 4 days and inability to pass urine since two days.

Case-5: A 3 years old Labrador was presented with a history of anuria for 24 hours preceded by haematuria and dysuria for the past 5 days.

On clinical examination, the dogs appeared dull, depressed, dehydrated, enlarged abdomen with distended urinary bladder and the dogs evinced pain on abdominal palpation. The animals were off feed and were exhibiting micturition reflex. Urethral catheterization revealed the presence of obstruction behind os penis. Lateral radiograph of the abdomen revealed the presence of multiple radio opaque calculi in the urinary bladder and urethra (Fig.1 to 5). The technique of urohydro-propulsion was employed initially in all the animals in order to dislodge and push the calculi back into the urinary bladder and to avoid double surgical operations but which was unsuccessful. Thereafter it was decided to go for urethrotomy and cystotomy under general anaesthesia for removal of multiple urethral and cystic calculi. Post operatively all the animals were maintained with low protein diet, ad libido drinking water and minimal salt intake resulted in uneventful recovery.

KEYWORDS: Cystic calculi, dietary management; surgical management; urethral calculi.

Treatment and Discussion
The dogs were premedicated with Atropine sulphate @ 0.04 mg/kg body weight s/c and Xylazine hydrochloride (Izine®) @ 1 mg/kg body weight i/m and general anaesthesia was induced with Ketamin hydrochloride @ 10mg/kg body weight i/m. The dogs were held in dorsal recumbency. An incision was made on the ventral midline of skin at the base of the penis and corpus
cavernous urethra was dissected to expose the lumen. The large calculi and few small calculi were removed. A PVC catheter of suitable size was inserted through the urethra and hydropropulsion was carried out with normal saline to clear urethra. Then the catheter was advanced up to the urinary bladder and the urine from the bladder was evacuated through the catheter. Urethral incision was closed by applying simple interrupted sutures using 3/0 chromic catgut. Muscles and skin were sutured in a routine manner.

Caudal paramedian incision just 2 inch posterior to umbilicus was adopted for laparatomy. The cystotomy was performed on the dorsal surface of the bladder, near the vertex. The cystoliths were removed and urinary bladder was flushed with normal saline. The cystotomy incision was closed by continuous Lembert sutures using chromic catgut No. 2/0 and abdominal incision was closed in two layers. Skin was sutured in routine manner. Post-operatively the animal was given Inj. Ampicillin – cloxacillin (AC-Vet®) @ 10 mg/kg body weight twice daily i/m for five days and Meloxicam (Melonex®) @ 1 mg/10 kg body weight intramuscularly for 3 days. The wound was dressed with Povidone iodine solution on alternate days. The urinary catheter was removed on fourth day in all the cases. The owner was advised to provide low protein diet and to provide water ad libitum for the dogs. It was advised to administer Cystone tablets for one month. The skin sutures were removed on the eighth post operative day.

Uroliths may be found throughout the urinary pathway and may occur on more than one site.
The majority found in dogs, however, have been in the lower urinary tract (Linda et al., 2011). The incidence and composition of uroliths may be influenced by a variety of factors including species, breed, sex, age, diet, anatomical abnormalities, urinary tract infection, medication and urine pH (Dolinsek, 2004). A high protein diet increases hepatic production of urea thereby increasing urea concentration in urine and renal medulla and it is well documented fact that dogs passing concentrate urine are more prone to developing urethral obstructions (Hand et al., 2000). The four most common minerals found in canine uroliths are magnesium ammonium phosphate (struvite), calcium oxalate, cystine and ammonium urate. More than 80% of uroliths in dogs are composed of struvite or calcium oxalate.

Uroliths may damage the epithelium and result in urinary tract inflammation which may give rise to haematuria, pollakiuria, dysuria and stranguria. Urethral uroliths originate from the urinary bladder. The calculi which lodge in the caudal end of the penis result in complete obstruction of urine flow. Hydropulsion, urethrotomy and cystotomy techniques have been described for managing such conditions. In the present report urethrotomy was performed to remove urethral calculi and cystotomy was adopted to remove the calculi from the bladder. Sometimes the retrograde hydropropulsion is not successful to dislodge the calculi (Saini et al., 2000) as observed in the reported cases.

The recurrence rate after one year was about 36% (Lulich and Osborne, 1995). With such a high recurrence rate, medical management, dietary modification and constant monitoring are all necessary objectives of postoperative care.

The main goals of dietary modification are to decrease calcium and oxalate concentration in the urine, to promote high concentration of crystal formation inhibitors in the urine, and to decrease urine concentration. Dietary protein should be restricted to 10% to 18% on a dry matter basis as higher levels of protein intake have been shown to significantly increase urinary calcium and oxalate excretion (Ling, 1995, Hand et al., loc.cit). Dietary sodium should be restricted to < 0.3% of dry matter, because urinary sodium excretion is directly correlated with urinary calcium excretion, such that increasing the excretion of one leads to an increase in excretion of the other. Dietary calcium should be restricted to between 0.3% and 0.6% of dry matter in order to reduce the chance of excessive absorption and excretion of calcium. Vitamin D and Vitamin C supplements should be avoided, since the former will enhance intestinal absorption of calcium and the latter serves as a precursor for oxalate (Hand et al., loc.cit). Non-specific therapy to prevent recurrence should include augmentation of water consumption. Animals that consume additional water will be less likely to form highly concentrated urine, and, as a result, the urine will contain lower concentrations of calculogenic minerals. This will in turn minimize formation of crystals and uroliths. This type of therapy is effective, inexpensive, and safe. In the present cases the animals were maintained with low protein diet, ad libidio drinking water and minimal salt intake resulted in uneventful recovery in all the animals and no recurrence of urinary calculi was reported in a follow up period of one year.

Summary
Successful surgical management of multiple urethral and urinary bladder calculi in five dogs was reported.

References