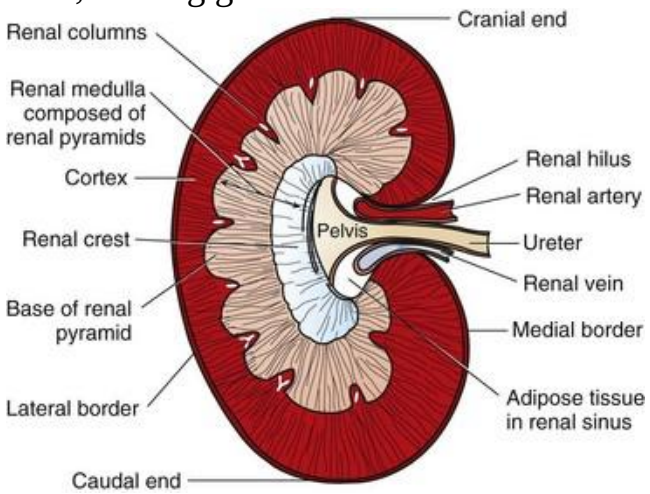
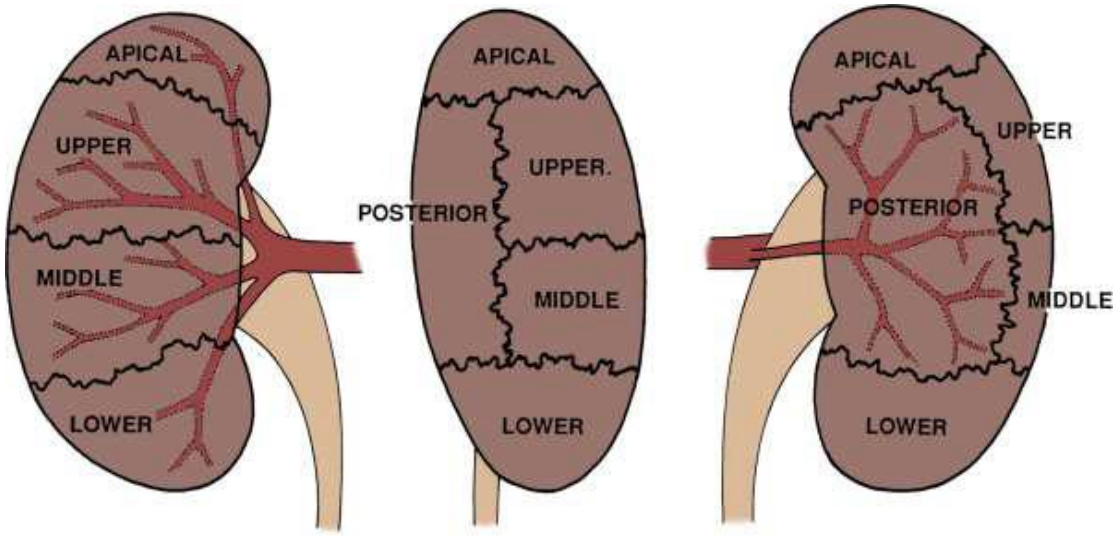
Nephrotomy

Gross Anatomy

The kidneys are paired, bean-shaped structures located in the retroperitoneal space directly beneath the sublumbar muscles. The cranial pole of the right kidney lies in the renal fossa of the caudate liver lobe and is located more cranially than the left kidney. The cranial pole of the left kidney lies lateral to the ipsilateral adrenal gland, which is closely associated with the cranial aspect of the left renal vessels. The left kidney is generally more mobile than the right kidney.

Each kidney has a cranial and caudal pole and a ventral and dorsal. The concave surface of the kidney is located along the medial aspect and is called the hilus. The hilus is the location where the renal artery enters the kidney and the renal vein and ureter exit. Nerves and lymphatic vessels enter at the hilus as well. Anatomically, the renal vein is located more ventrally, and the renal artery is more dorsally. In an animal of normal body condition, the kidney is typically surrounded by a substantial amount of fat; this fat is maintained even in lean animals. In obese animals, the surrounding adipose tissue can virtually hide the kidney from view, making gross evaluation difficult.

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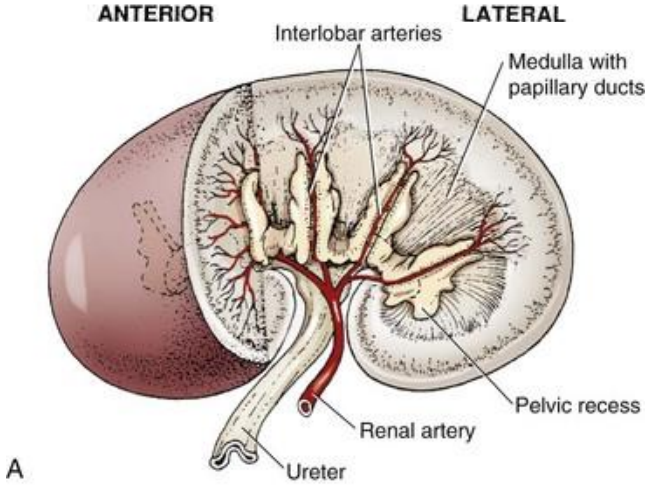
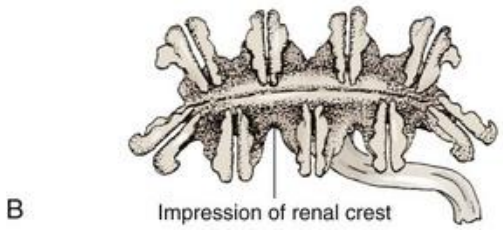
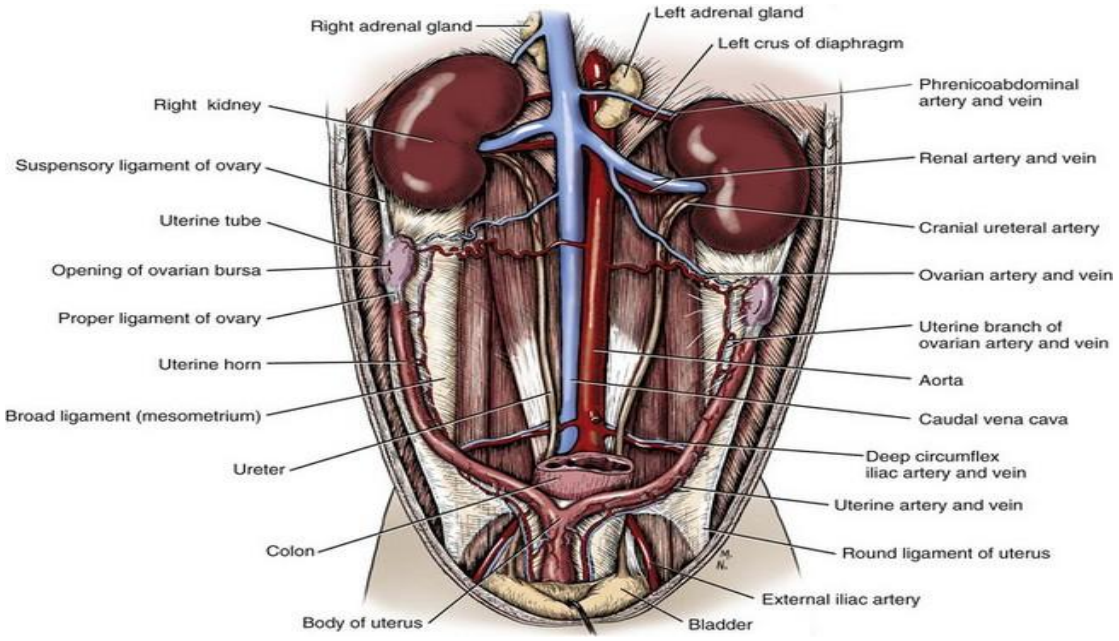
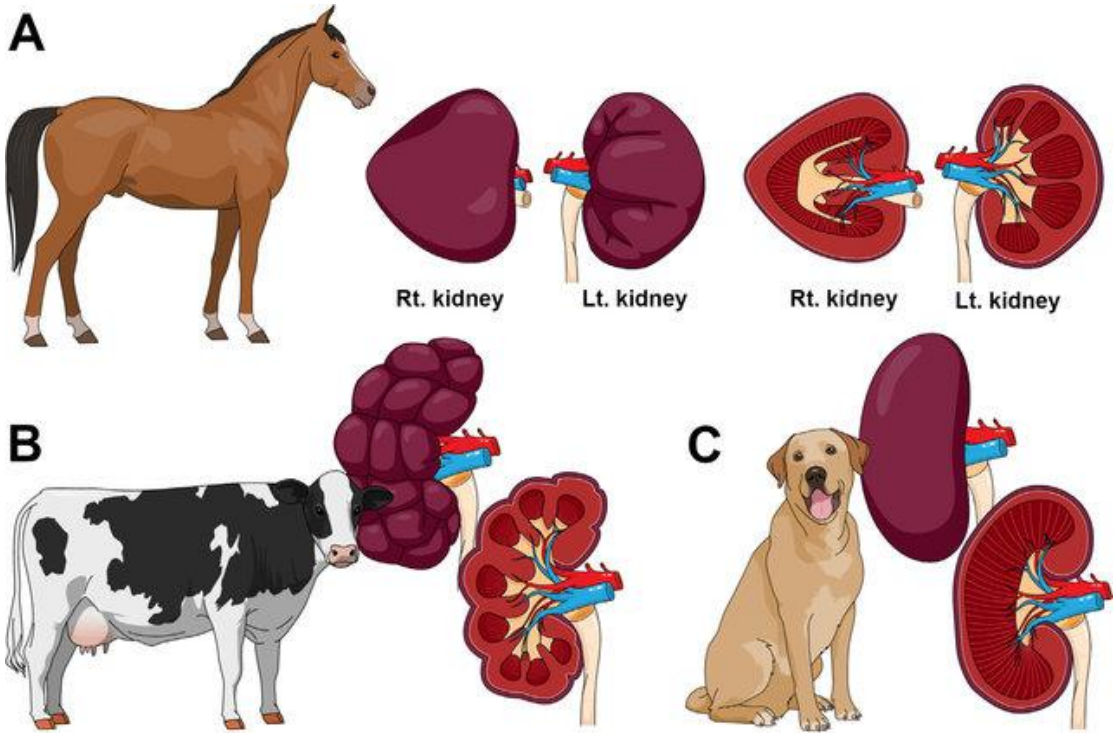

Interlobar arteries
Medulla with papillary ducts
Pelvic recess
Renal artery
Ureter
A


Impression of renal crest
B



Other kidneys model



Indication of nephrotomy Perioperative Management

Surgery is recommended for patients with unresponsive pyelonephritis; perinephric abscesses or cysts; unilateral renal neoplasia; severe renal trauma; or ureteral conditions that cause severe, irresolvable hydronephrosis.

Diagnostic Tests

In general, a complete blood count, biochemistry and coagulation panels, urinalysis, urine culture, and blood pressure should be evaluated in any animal undergoing renal surgery.[90] Systolic blood pressure greater than 180 mm Hg is considered abnormal. The risk of hemorrhage during or after surgery is increased in patients with azotemia, hypertension, or thrombocytopenia. Buccal mucosal bleeding time is recommended in animals with uremia, which impairs platelet adhesion and aggregation. A cross-match should be performed in any animal with coagulopathy or anemia or in which excessive bleeding is expected. In one study, coagulation panels were abnormal in 39.8% of dogs and 51.9% of cats tested before renal biopsy.

Pyelography

Although IV administration of contrast is most common for renal contrast studies, direct injection into the renal pelvis has been used.[80] This procedure is indicated when there is concern about giving a systemic dose of contrast or when the renal artery is obstructed.

Ultrasonography

Ultrasonography provides an excellent means for noninvasively evaluating renal structure in animals. One study of ultrasonographic evaluation of renal parenchymal disease in dogs reported that ultrasonography was most specific for focal, multifocal, and diffuse diseases of the kidney and least effective for parenchymal diseases that did not have specific-architectural renal disruption.

Computed Tomography

Computed tomography (CT) provides good images of the kidney, particularly when contrast enhancement is performed. In one study comparing ultrasonography, CT, and scintigraphy in cats with normal and polycystic kidneys, noncontrast CT studies provided minimal benefit

regarding cyst identification. When contrast CT was performed, however, cysts within renal parenchyma were more easily identified.[76]

Magnetic Resonance Imaging

Contrast-enhanced magnetic resonance angiography (MRA) has been used for quantitative and qualitative evaluation of renal vessels in humans. In a recent experimental study, MRA permitted distinguishing of renal arteries and veins in normal dogs

Nephrotomy/Nephrolithiasis

Nephroliths are urinary calculi located within the renal pelvis and/or collecting diverticula of the kidney. Increase in size of a calculus may OBSTRUCT or cause compressive injury of the renal parenchyma leading to renal failure.

Nephroliths may be asymptomatic or they may produce obstruction of the renal pelvis and/or ureter.

Clinical Signs

- Hematuria
- Azotemia/Uremia (bilateral or unilateral and concurrent renal disease in second kidney)
- Recurrent UTI
- Abdominal pain

Nephrotomy Technique

1. Expose the right or left kidney as previously described.
2. Temporarily occlude the blood supply to the kidney by one of the following methods.

- -Digital occlusion by a surgical assistant

• -Use of bulldog clamps (PREFERRED)

• -Use of a Rumel tourniquet

• LIMIT OCCLUSION TO 15-20 MINUTES MAX

3. Make a longitudinal incision directly over the convex surface of the kidney; use the blunt end of the scalpel handle to bluntly separate parenchyma down to the calculus.

4. Remove the calculus, culture the renal pelvis, flush the renal pelvis and pass a catheter into the proximal ureter.

5. Pull the two halves of the kidney together and close the nephrotomy incision with 4/0 PDS in a continuous pattern engaging the renal capsule and small bites of parenchyma. Bites are taken close together so they don't tear out of tissue.

6. Consider renopexy by suturing one pole of the kidney to the musculature to prevent torsion on its blood supply.

Strongly recommend against performing concurrent bilateral nephrotomy in dogs with bilateral calculi. Stage the surgeries 6 weeks apart.