Scrotal Ultrasound Protocol

I. Patient Preparation

a. None
b. Document (1) signs and symptoms including side and/or (2) relevant history (including known diagnoses).

II. Equipment

a. Performed with real-time scanner using a linear 12.5MHz transducer. Occasionally a linear 17 MHz transducer may be needed for pediatric/infant studies or for optimizing lesions within the testes.

III. Procedure Protocol

a. Patient Positioning

i. Elevate testis with folded towel.
ii. Ask patient to rest penis over anterior abdomen and cover with a second towel
iii. If patient is 10 years or younger, palpate the testes to ensure both are seated well within the scrotum, or note otherwise and notify the Radiologist to scan.
iv. Use warm gel. Of note, utilizing cold gel may cause the skin on the scrotum to contract and become thick or may cause the testicles to ascend in the scrotal sac making imaging more difficult.
v. May need to apply slight pressure to immobilize testis while scan performed; however, important to scan with minimal pressure to visualize fluid overlying testis.

b. Normal Evaluation

i. Testicle Length: 3-5 cm
ii. Testicle Width: 2-4 cm
iii. Testicle AP: 3 cm
iv. Always scan testicle and epididymis in their entirety. Compare size, shape, vascularity and echogenicity of each to opposite side. Document an intra or extra testicular mass or lesion to include size, shape, vascularity, and location. A transverse scan showing both testicles side by side should be performed to identify differences in size and echogenicity, and vascularity.
v. The normal scrotum contains small amounts of serous (anechoic) fluid between the layers of the tunica vaginalis, which is considered physiologic (not a hydrocele).

c. Right Testicle

i. Long Axis Views

1. Mid portion
2. Mid portion with maximum length and AP diameter measured
3. Mid portion with color/power Doppler
4. Lateral border
5. Medial border

ii. Transverse Views

1. Superior portion
2. Mid portion
3. Mid portion with maximum transverse diameter measured
4. Mid portion with color/power Doppler
5. Mid portion with color/power Doppler as well as spectral Doppler with a tracing for **each** venous and arterial flow for patency. Measurement of the RI for the arterial waveform if possible.
6. Inferior portion

d. Right Epididymis

i. Long Axis Views

1. Mid portion
2. Mid portion with maximum length and AP diameter measured
3. Mid portion with color/power doppler

ii. Transverse Views

1. Mid portion
2. Mid portion with maximum transverse diameter measured
3. Mid portion with color/power doppler

e. Left Testicle

i. Long Axis Views

1. Mid portion
2. Mid portion with maximum length and AP diameter measured
3. Mid portion with color/power Doppler
4. Lateral border
5. Medial border

ii. Transverse Views

1. Superior portion
2. Mid portion
3. Mid portion with maximum transverse diameter measured
4. Mid portion with color/power Doppler
5. Mid portion with color/power Doppler as well as spectral Doppler with a tracing for **each** venous and arterial flow for patency. Measurement of the RI for the arterial waveform if possible.
6. Inferior portion

f. Left Epididymis

i. Long Axis Views
   1. Mid portion
   2. Mid portion with maximum length and AP diameter measured
   3. Mid portion with color/power Doppler

ii. Transverse Views
   1. Mid portion
   2. Mid portion with maximum transverse diameter measured
   3. Mid portion with color/power Doppler

g. Scrotal Sac

i. Evaluate scrotal skin thickness with measurement when indicated.

ii. Document any fluid collection in or around scrotal sac with measurement when indicated.

iii. Demonstrate both testicles located within the scrotal sac on the same image to check for symmetrical echogenicity.

iv. Demonstrate both testicles with power/color Doppler on the same image to check for asymmetrical hyperemia or presence of torsion.

h. Vascularity

i. Normal vascular findings

1. Brief Doppler examination using PW, Color Doppler or Power Doppler to document flow in and around each testicle and epididymis.
2. Normal Flow Patterns
   a. Intratesticular and capsular arteries have a low impedance pattern with high diastolic flow
   b. Intratesticular artery: RI = 0.48-0.75 (mean 0.62)
   c. Capsular artery: RI = 0.46-0.78 (mean 0.62)
   d. Supratesticular arteries (testicular, cremasteric, deferential arteries) have increased vascular resistance with a variable high resistance flow pattern (RI=0.63-1.00, mean 0.84)

ii. Torsion Indication:
   1. PW, Color Doppler or Power Doppler may be used to document flow in and around each testicle and epididymis.
   2. Low/slow flow setting maintained during examination
   3. Compare symptomatic or “acute” testicular/epididymal flow with asymptomatic side. Should include at least one side-by-side image comparing both testes.
   4. PW and/or Color Doppler may also be used to document vascularity of any abnormality
   5. Pitfalls

a. Spontaneous torsion/detortion may mimic epididymo-orchitis with hyperemia
b. Incomplete torsion may continue to show intratesticular flow.

6. Patterns
    a. Too much flow/color (firestorm) frequently associated with inflammation/infection
    b. Disordered/disorganized: frequently associated with tumor
    c. Too little flow/color: frequently associated with torsion

i. Varicocele Assessment

i. Definition/Incidence

1. Abnormal degree of venous dilation in the pampiniform plexus
    a. 2 Types
        i. Primary (idiopathic) due to incompetent valves within internal spermatic vein
        ii. Secondary – due to increased pressure on spermatic vein (causes include hydronephrosis, hepatomegally, abdominal neoplasm, retroperitoneal mass)
2. 15% prevalence, 85% left sided, 10% bilateral
3. Consider secondary varicocele is varicocele is right sided, non-decompressible, unaffected by change in patient position, newly discovered in a patient over 40 years as these are rarely idiopathic.
4. Gray Scale/Color Doppler Assessment
    a. 2 or 3 venous channels, at least one $\geq$2-3mm, with increase in size with Valsalva/standing (normal veins of pampiniform plexus range from 0.5 to 1.5mm in size)
    b. Spontaneous venous flow (only intermittently seen in normal adults)
    c. Increased venous flow with Valsalva / standing
    d. Standing Valsalva maneuver MUST BE performed:
        i. On all patients with an indication of infertility.
        ii. On all patients with clinically suspected varicocele or possible varicocele encountered ($\geq$2mm) during any ultrasound evaluation with patient supine.
5. If varicocele identified, the scan should be extended to assess the testicular veins for the point of origin. For

example, extratesticular masses such as pelvic lymphadenopathy could be compressing the veins.

j. Additional assessments

i. Palpable area must be directly imaged
ii. Valsalva maneuver should always be performed to assess for the presence of an inguinal hernia
    1. Inguinal hernia should be assessed for the presence of bowel (peristalsing or non-peristalsing), fluid.
iii. Inguinal canal can be assessed to evaluate for mass, undescended testicle, spermatic cord inflammation, inguinal hernia.
iv. In the setting of scrotal wall thickening/edema, assess the extent of involvement (i.e., perineum), abcess.