Parotid/Submandibular/Sublingual Gland Ultrasound Protocol

I. Patient Preparation

a. None

II. Equipment

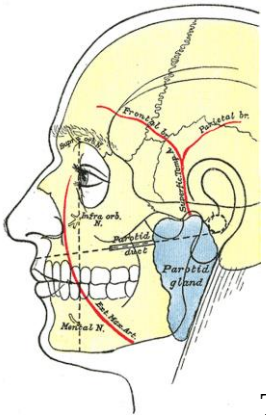
a. Performed with real-time scanner using a linear 12.5 MHz transducer (7 to 14 MHz). Occasionally a linear 17 MHz transducer may be needed for optimization of thyroid nodule(s) or for pediatric neck imaging. A curved 5MHz transducer may be needed to visualize the deep portion of the submandibular or parotid glands.
b. Color/power Doppler to evaluate vessels and vascularity of a structure

III. Procedure Protocol

a. Patient Positioning
    i. Patient is supine on stretcher/bed with pillow placed underneath shoulders.
    ii. Neck is hyper-extended over edge of pillow (tilt the head back for better access).
    iii. Low collared shirt, remove jewelry around neck, towel across shoulders/chest, pillow or towel can be placed under shoulders
b. Images
    i. Long parotid or submandibular gland
    ii. Transverse parotid or submandibular gland
    iii. Parotid gland assessment includes both the superficial lobe (superficial to the mandible) and the deep lobe (deep portion to the mandible at the angle)
c. Document any visualized parotid or submandibular gland abnormalities to include size, shape and position using dual screen; PW and/or Color Doppler used to document vascularity of parotid or submandibular gland or any abnormality, to distinguish between cystic structures and prominent thyroid vessels, or when clinically indicated. Also, document the most suspicious features of any nodule (microcalcification, septation, solid hypoechoic).
    i. The gland should be homogeneous in echogenicity with a relatively slightly hypoechoic homogeneous echotexture compared to the surrounding tissues similar to the muscle echogenicity. The parotid gland is more attenuating of the sound beam compared to the submandibular gland due to its greater fat content.
    ii. The intraglandular ducts demonstrate small linear hypoechoic parallel stripes.
    iii. Compare both sides
    iv. Scan the gland in entirety from midline to lateral several times to assess size, increased vascularity, any surrounding abnormality

(such as lymph nodes), duct dilatation (must use color/power Doppler so you do not mistake a vessel for a dilated duct).

d. Initially, a full survey of the parotid or submandibular gland should be performed to check for abnormalities. Imaging should start with the general survey pictures as listed below for right/left and then followed by split-screen images of each nodule/mass, in order of importance, with and without calipers and color/power Doppler. The images must be labeled clearly with side of parotid, trans/long and level of which the area is within the gland (sup, mid, inf).
e. Evaluate the Warton's duct or submandibular duct for calculi or dilatation.
f. Superficial and Deep Lobe of Parotid Gland
    i. Transverse Views
        1. Mid
        2. Mid– include maximum width diameter measurement and color/power Doppler
        3. Superior
        4. Inferior
    ii. Long Axis Views
        1. Mid portion
        2. Mid portion – include maximum length and AP diameter measurements and color/power doppler
        3. Lateral portion
        4. Medial portion
    iii. Accessory parotid gland views
    iv. Right side of neck and lymph nodes
    v. Left side of neck and lymph nodes
    vi. If nodules are present:
        1. Dual screen images of each mass/lesion with long axis view on left, transverse view on right.
        2. Label on screen left lobe, what level (inf,mid,sup) and number each one.
        3. Take gray scale images with and without calipers and color/power Doppler.
        4. Also, image the most suspicious features of the parotid lesion

vii.  

The parotid gland will be seen wrapping around the angle of the mandible up to the tragus of the ear. An extension of the superficial lobe of the parotid gland or accessory parotid gland lies medially on the cheek and serves as a landmark for the parotid duct

viii. 
An accessory parotid gland can sometimes be seen just medial to the superficial lobe of the main parotid gland using this scan plane.

ix. 

Normal parotid gland (superficial lobe seen best with this probe, although the deep lobe is suboptimally evaluated due to loss of through transmission, therefore either a 5 MhZ probe or different scan location to better visualize the deep lobe of the parotid gland is necessary).

x. The parotid gland may contain intraparotid lymph nodes (would have same morphology as other lymph nodes); however, as the submandibular gland forms earlier embryologically, the submandibular gland should never contain any other tissue! (so do not assume lymph node in a submandibular gland).

xi. The normal parotid gland is homogeneous in echotexture. The parotid gland is far more attenuating of the sound beam compared to the submandibular gland due to its greater fat content. Use color/power Doppler to differentiate vessels from dilated ducts and to assess for increased vascularity. The parotid duct (Stensen's duct) runs from the deep lobe of the parotid gland to the lingual frenulum. The ducts starts at the level of the ear lobe and courses across the cheek via the accessory parotid gland (the duct generally will not be visible unless dilated).

g. Submandibular Gland

i. Transverse Views
    1. Gray scale
    2. Include maximum width diameter measurement and color/power Doppler

ii. Long Axis Views
    1. Mid portion
    2. Mid portion – include maximum length and AP diameter measurements and color/power doppler
    3. Lateral portion
    4. Medial portion

iii. Submandibular duct views

iv. Right side of neck and lymph nodes

v. Left side of neck and lymph nodes

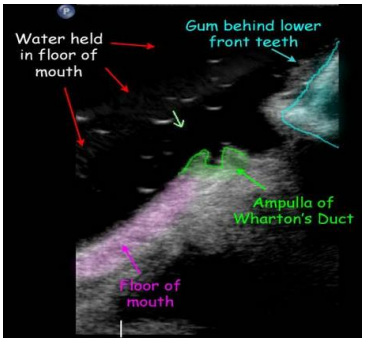
vi. If nodules are present:
    1. Dual screen images of each mass/lesion with long axis view on left, transverse view on right.
    2. Label on screen left submandibular gland, what level (inf,mid,sup) and number each one.
    3. Take gray scale images with and without calipers and color/power Doppler.
    4. Also, image the most suspicious features of the submandibular lesion

vii. 


The normal submandibular gland is homogeneous in echotexture. Intraglandular ducts are small linear hypoechoic parallel lines. Use color/power Doppler to differentiate vessels from dilated ducts and to assess for increased vascularity. The submandibular duct (Wharton's duct) starts from within the hilum of the gland, follow the duct to the submental region. It is easiest to locate the superficial portion of the duct in the medial aspect of the submandibular gland and follow around the posterior border of the myohyoid muscle, then medial to the sublingual gland to the papilla at the floor of the mouth.

viii. The Kuttner lymph node is between the parotid and submandibular gland.

ix. Optional intra-oral scanning evaluation
    1. Can assist with assessing the ampulla and papilla.
    2. Use a probe with a small foot print (hockey-stick is ideal)
    3. Some patients may not be able to tolerate due to "gagging" sensation
    4. Remove any false teeth
    5. Perform with patient erect position
    6. Ask patient to roll tongue back out of the way
    7. Ensure probe covered with a non-latex cover
    8. Patient required to hold a small amount of water in the floor of their mouth to scan through
    9. Inform the patient to tap you on the arm if they need you to stop or if they need to swallow.

10.  

Intraoral view of Wharton's duct (submandibular duct) papilla

h. Adjacent Soft Tissues

i. Abnormalities of adjacent soft tissue should be documented to include size, shape and position.

1. Enlarged lymph nodes
2. Thrombosed veins
3. Adjacent soft tissue mass/lesion

i. Sublingual glands

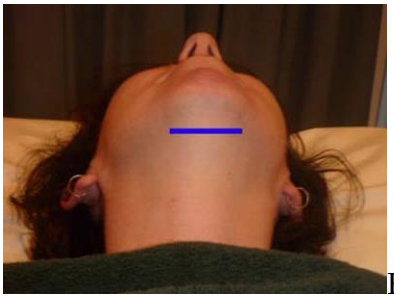
i. Transverse Views
   1. Gray scale
   2. Include maximum width diameter measurement and color/power Doppler

ii. Long Axis Views
   1. Mid portion
   2. Mid portion – include maximum length and AP diameter measurements and color/power doppler
   3. Lateral portion
   4. Medial portion

iii. Right side of neck and lymph nodes

iv. Left side of neck and lymph nodes

v. If nodules are present:
   1. Dual screen images of each mass/lesion with long axis view on left, transverse view on right.
   2. Label on screen left submandibular gland, what level (inf,mid,sup) and number each one.
   3. Take gray scale images with and without calipers and color/power Doppler.
   4. Also, image the most suspicious features of the submandibular lesion

vi.  Best visualized via the submental position. The gland is obscured anteriorly by the mandible. Typically the sublingual ductal system cannot be visualized. The sublingual glands are located deep to the mylohyoid muscle and lateral to the genioglossus/geniohyoid muscles.

vii. Normally homogeneous hyperechogenicity similar to the parotid gland. Average size of sublingual gland is 32 x 12 mm

j. **Neck with Entire Thyroid Gland**

i. Transverse view of ML neck with entire thyroid gland visible to compare echogenicity of lobes simultaneously.

ii. Same image including color/power Doppler to check for symmetry of vascularity

- 7 -