Imaging of Inflammatory Disorders of Salivary Glands

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KEYWORDS

• Salivary gland • Sialadenitis • Inflammation • Parotitis • Autoimmune • CT • MR imaging

KEY POINTS

- Sialadenitis is the most common disease of the major salivary glands.
- Sialadenitis typically presents with pain and swelling of the involved glands.
- Infection is the most common cause of the acute sialadenitis; chronic sialadenitis has many different causes.
- Obstructive sialadenitis most commonly involves the submandibular gland, whereas nonobstructive sialadenitis more commonly involves the parotid gland.
- Autoimmune diseases are the most common cause of nonobstructive sialadenitis.
- Imaging often can establish the cause of sialadenitis.

INTRODUCTION

Sialadenitis, inflammation of the salivary glands, is the most common disease involving salivary glands. Inflammation can occur as the common endpoint for a wide variety of conditions. Although the inflammation is sometimes idiopathic, it is often attributable to well-recognized infectious causes or autoimmune conditions (**Box 1**). The most typical presentation of sialadenitis is pain, with or without enlargement of the involved gland. Depending on the cause, the presentation can be acute or chronic exacerbation of a chronic sialadenitis.

IMAGING APPROACH OF SALIVARY GLAND INFLAMMATION

Acute sialadenitis of the major salivary glands is generally easily clinically recognized given the intense pain and swelling localized to the parotid, submandibular, or sublingual gland. Occasionally, clinical presentation can be confusing and precise clinical localization can be difficult. Sialadenitis might be confused with salivary gland tumor, odontogenic disease, facial cellulitis, adenopathy, or otitis externa. Radiologic evaluation can generally provide an accurate diagnosis of sialadenitis, evaluate for obstructive calculus, or evaluate for complications. Many different imaging technologies are available for the evaluation of the salivary glands. Appropriate use of imaging mainly depends on availability of a technique and the clinical questions that need to be answered. A general approach is depicted in **Fig. 1**.

Conventional Radiograph

Conventional radiograph can identify most of the submandibular stones because they are radiopaque

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Box 1
Inflammatory diseases of salivary glands

1. Acute sialadenitis
   a. Acute suppurative sialadenitis
   b. Acute viral sialadenitis
   c. Trauma
2. Chronic sialadenitis
   a. Sjögren syndrome
   b. HIV-associated salivary disease
      i. Benign parotid enlargement
         1. Viral sialadenitis–related
         2. Antiretroviral therapy–related
      ii. Lymphocytic parotid enlargement
         1. Persistent generalized lymphadenopathy
         2. HIV-associated BLEL
         3. HIV-associated BLEC
   c. Granulomatosis with polyangiitis (Wegener granulomatosis)
   d. Sarcoidosis
   e. Eosinophilic lymphogranuloma (Kimura disease)
   f. Chronic sclerosing sialadenitis
   g. Chronic granulomatous infectious sialadenitis
   i. Tuberculosis
   h. Postirradiation sialadenitis
3. Obstructive sialadenitis
   a. Sialolithiasis
   b. Chronic sialadenitis of the parotid gland
   c. Sialodochitis fibrinosa
   d. Ductal foreign bodies
4. SGD due to unique reparative process
   a. Necrotizing sialometaplasia
   b. Adenomatoid hyperplasia
   c. Sclerosing polycystic adenosis
5. Noninflammatory nonneoplastic SGD
   a. Sialosis

Abbreviations: BLEL, benign lymphoepithelial lesion; BLEC, benign lymphoepithelial cyst; SGD, salivary gland disease.

and relatively large. However, the use of the conventional radiograph has diminished over the years given the availability of cross-sectional imaging, especially computerized tomography (CT) scans.

Conventional sialography is an invasive technique in which contrast is directly injected into the main ducts of the parotid or submandibular glands. When the proper technique is used and the patient is cooperative, this can provide excellent depiction of the morphology of the extra- and intraglandular ductal system. Strictures, ductal dilations, and architecture and arborization pattern of the intraglandular ductal system can be exquisitely detailed with conventional sialography. Over the years, use of conventional sialography has also faded owing to the invasiveness of this technique. If necessary, MR sialography can be performed. This is a noninvasive technique and can reasonably evaluate the ductal system.

Ultrasound

Modern high-resolution ultrasound scanners equipped with high-frequency linear transducers can generate excellent images of the major salivary glands. Superficial locations of the glands also contribute to high-quality images. Ultrasound examination by an experienced sonographer can easily identify ductal dilation, calculus, abscess formation, and alteration of the normal glandular morphology. Ultrasound examination with Doppler technology can also easily identify a vascular lesion and can be used to assess vascularity of a lesion.[1]

Cross-Sectional Imaging

Cross-sectional imaging with CT and MR imaging is more commonly used in the developed countries for evaluation of the salivary glands. Both techniques can generate high-quality images of the major salivary glands with excellent soft tissue details that are usually adequate for management of different salivary gland pathologies. A CT scan is excellent for detection of radiopaque stones and MR imaging is better for evaluation of parenchymal architecture. Short-tau inversion recovery sequence is excellent for detection of edema associated with sialadenitis. Diffusion-weighted MR imaging can be helpful in evaluation abscess and in evaluation of postradiation sialadenitis. MR sialography, a heavily T2-weighted imaging technique, has the potential for evaluation of the ductal system of the major salivary glands.

Imaging Approach

There is no strict guideline describing appropriate use of imaging in evaluation of sialadenitis. This largely depends on the availability of different imaging technologies and local expertise. Modern