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DIAGNOSIS

# Diagnosis of Sjögren's disease

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## Abstract

The diagnosis of Sjögren's Disease (SjD) can be challenging due to the broad disease spectrum and often subtle presenting manifestations. As a result, many patients continue to suffer for years due to a delayed diagnosis. As initial symptoms often present in oral cavity, the oral health care team may be the first to suspect the condition. To support those efforts, this article will review the most common signs and symptoms, diagnostic criteria, and chairside diagnostic procedures for SjD which include sialometry and the labial salivary gland biopsy. Unique patient questions, important to the data collection process, are presented as well as the updated diagnostic criteria. While the diagnosis and management of SjD is a multi-specialty endeavor, the dentist can play a critical role in a timely diagnosis.

**Keywords** Sjögren's disease · Sjögren's syndrome diagnosis · Xerostomia

## Quick reference/description

Sjögren's disease (SjD) is a complex disease with multiple components and a broad clinical spectrum. The oral health management team is sometimes the first to diagnose SjD due to the oral manifestations, particularly diminished saliva and increased caries. Diagnosis of such a complex disease depends on a thorough review of the patient's symptoms and medical history along with relevant clinical and laboratory investigations. Diagnosis of SjD should depend on a complete examination including at least a head and neck assessment, salivary flow evaluation, oral and maxillofacial imaging and in most cases, a labial salivary gland biopsy. Proper serological and ophthalmological tests should also be conducted. During initial assessment, it is crucial to review medical conditions like asthma, diabetes mellitus, rheumatic diseases, gastrointestinal disorders, hypertension, hematological diseases, thyroid diseases,

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psychiatric disorders and eating disorders as they can be associated with xerostomia and hyposalivation or can occur concurrently with SjD.

While the oral health team may focus on head and neck issues, it is important to listen to the patient for a global perspective and plan to consider and/or exclude conditions that present with manifestations similar to SjD. It should be noted that the guidance below applies primarily to patients over 18 years of age since defining the diagnostic criteria, clinical characteristics, and natural history of childhood/pediatric SjD is currently in progress by the multidisciplinary international workgroup.

## Signs and symptoms

Patients with potential SjD may present with any combination of the following concerns.

- Oral dryness or xerostomia
- Ocular dryness or keratoconjunctival sicca
- Arthritis or arthralgia
- Overwhelming fatigue
- Severe chronic pain
- Salivary gland enlargement and/or recurrent parotitis
- Changes in sense of taste
- Speech difficulties
- Difficulty swallowing
- Increase in dental decay (cavities)
- Oral ulcers
- Extraglandular manifestations involving various organs

A brief overview of these signs and symptoms might provide helpful background.

Oral dryness (salivary hypofunction) and/or xerostomia (patient's subjective perception of oral dryness) are the most common oral manifestations and complications of SjD. These are associated with other autoimmune conditions as well such as systemic lupus erythematosus (SLE), scleroderma, and rheumatoid arthritis (RA). Symptoms of post radiation therapy for head and neck carcinoma, fibromyalgia, HIV infection, hepatitis C, diabetes, depression, and polypharmacy e.g., antidepressants, antihypertensives, and antihistamines, may include xerostomia. Unfortunately, the importance of xerostomia is sometimes underestimated. Xerostomia has a negative impact on patients' attitudes and emotional state. It requires a complete assessment of a patient's overall health, oral sensory and motor abilities, and salivary flow rates. Sialometry, an objective measurement of salivary flow rate, may be unstimulated or stimulated as described in the section on Procedures and Materials. As noted in Table 1, the unstimulated salivary flow rate is included in the 2016 diagnostic criteria.

**Table 1** Revised AECG Criteria and the Sjogren's International Collaborative Clinical Alliances Cohort used for the Diagnosis of Primary Sjögren's Disease

| | |
|---|---|
| ***2002 Revised AECG criteria*** | |
| Diagnosis of Sjögren's disease defined as the presence of four out of the six items, including positive histology or serology, or the presence of three of the four objective items | |
| 1. Ocular symptoms: positive response to one of the following questions:<br>(a) Have you had daily persistent trouble with dry eyes for more than 3 months?<br>(b) Do you have a recurrent sensation of sand or gravel in the eyes?<br>(c) Do you use tear substitutes more than three times per day? | |
| 2. Oral symptoms: positive response to one of the following questions:<br>(a) Have you had a daily feeling of dry mouth for more than 3 months?<br>(b) Have you had recurrent or persistent swollen salivary glands as an adult?<br>(c) Do you frequently drink liquids to aid swallowing dry food? | |
| 3. Ocular signs: positive result for one of the two tests:<br>(a) Schirmer's test performed without anesthesia (≤5 mm in 5 min)<br>(b) Rose Bengal score or other ocular dye score (≥4 according to van Bijsterveld scoring system) | |
| 4. Histopathology: focal lymphocytic sialadenitis with a focus score ≥1 focus per 4 $mm^2$ of minor salivary glandular tissue | |
| 5. Salivary gland involvement: a positive response for at least one of the following diagnostic tests:<br>(a) Unstimulated whole salivary flow (≤1.5 mL in 15 min)<br>(b) Parotid gland sialography showing the presence of diffuse sialectasis without evidence of obstruction in the glands or<br>(c) Salivary scintigraphy showing delayed uptake, reduced concentration, and/or delayed excretion of tracer | |
| 6. Autoantibodies: presence in serum of antibodies to Ro (SSA) or La (SSB) antigens, or both | |
| ***2012 ACR classification criteria for Sjögren's disease*** | |
| 1. Positive anti-SSA (Ro) and/or anti-SSB (La) or positive RF and ANA ≥ 1:320 | |
| 2. Labial salivary gland biopsy with a focal lymphocytic sialadenitis with a focus score ≥ 1 foci/4 $mm^2$ | |
| 3. Keratoconjunctivitis sicca with an ocular staining score ≥ 3 | |
| ***2016 ACR/EULAR classification criteria for primary sjögren's disease*** | |
| 1. Anti-SSA/Ro antibody positivity | Score = 3 |
| 2. Focal lymphocytic sialadenitis with a focus score of ≥ 1 foci/4 $mm^2$ | Score = 3 |
| 3. Abnormal ocular staining score of ≥ 5 (or van Bijsterveld score of ≥ 4) | Score = 1 |
| 4. Schirmer's test result of ≤ 5 mm/5 min | Score = 1 |
| 5. Unstimulated salivary flow rate of ≤ 0.1 mL/min | Score = 1 |

Individuals with signs or symptoms suggestive of SjD with a total score of ≥ 4 for the above items meet the 2016 criteria for primary SjD. Sensitivity and specificity against clinician-expert-derived case/non-case status in the final validation cohort were high, that is, 96% (95% CI 92%–98%) and 95% (95% CI 92%–97%), respectively.

Ocular dryness or keratoconjunctival sicca, is a common manifestation of SjD as well. The patient may complain of dry eyes or a feeling of sand or grit in the eyes. Most often, an ophthalmologist will perform tests to determine ocular dryness, via a Schirmer test or ocular surface staining. A Schirmer test evaluates aqueous tear production. Sterile filter paper strips are applied into the inferior-temporal aspect of the conjunctival sac. The millimeters of wetness reflect tear production. A measurement of less than 5 mm in 5 min without topical anesthesia is considered deficient tear production. The dye tests use a fluorescein dye or Lissamine green dye applied to the ocular surface for the cornea or the conjunctiva staining, respectively. The dye will adhere to areas of the ocular surface where

the epithelium has ulcerated due to lack of lubrication. The areas of damage are evaluated by an ophthalmologist.

A history of arthritis, overwhelming fatigue, or chronic pain would be elicited on the comprehensive medical exam, followed by a referral to the appropriate clinician.

Salivary gland enlargement could be attributed to bacterial sialadenitis, sialolithiasis, viral infection such as mumps, salivary gland tumor, such as pleomorphic adenoma, and lymphoma, such as mucosa-associated lymphoid tissue (MALT) lymphoma in SjD. Therefore, the diagnosis of SjD can be expedited by imaging modalities to further assess major salivary gland enlargement (parotid, submandibular, or sublingual). These modalities include, but are not limited to: occlusal imaging, transcranial imaging, salivary gland ultrasound (SGUS), cone beam CT, medical CT, magnetic resonance imaging (MRI), sialography, and scintigraphy. These are discussed further in the section on Oral and Maxillofacial Imaging.

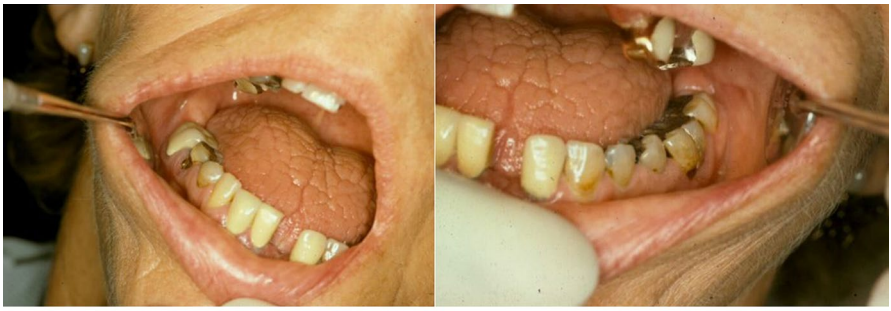
Changes in salivary gland health can impact salivary flow and associated taste. Alterations in taste are not always present in SjD disease, but are often associated with salivary gland hypofunction. Diminished salivary flow is also linked to speech and swallowing difficulties due to lack of lubrication. Lacking protective salivary proteins and lubrication due to hyposalivation can promote increased dental decay. Saliva aids flushing of organisms from the mouth and provides buffer effects for neutralization of the harmful effects of acids which promote dental erosions.

Lack of flow and specific salivary proteins can enhance conditions for oral candidiasis, an opportunistic infection. These concerns can be characteristic findings of SjD.

## Differential diagnosis

- Systemic lupus erythematosus
- Scleroderma
- Rheumatoid Arthritis
- Fibromyalgia
- IgG4-related disease
- Sialadenosis
- Epstein-Barr Virus (EBV) infection
- HIV infection
- Hepatitis C infection
- Sarcoidosis
- Amyloidosis
- Eosinophilic sialodocheitis
- Sialolithiasis
- Chronic sialadenitis
- Graft versus host disease (GVHD)

Due to multi-system involvement, as well as oral manifestations, many conditions must be differentiated from SjD. SLE, scleroderma, RA, fibromyalgia, or GVHD may include xerostomia, xerophthalmia, hyposalivation, hypolacrimation,



**(a)** *Fissured tongue* **(b)** *Class V caries and multiple crowns and missing teeth*

**Fig. 1** Dry mouth complications. **a** Fissured tongue **b** Class V caries and multiple crowns and missing teeth

autoantibodies, fatigue, and/or arthralgia. IgG4-related disease can present with enlarged salivary glands and lymphadenopathy, and EBV also with lymphadenopathy, fever, and fatigue. Enlarged salivary glands can also be a component of sialadenosis, HIV infection, hepatitis C infection, sarcoidosis, amyloidosis, eosinophilic sialodocheitis, sialolithiasis, and chronic sialadenitis.

## Examination

SjD is a complex disease. As such, patients may receive an incorrect or a delayed diagnosis due to multiple organ involvement evaluated by several specialists lacking a collaborative team approach. The oral health team can perform the examination below, initiate appropriate referrals, communicate findings, and be an integral component of the overall health care team. The initial oral health examination could include the following components and procedures.

Intraoral and Extraoral Comprehensive Dental Assessment, also termed Head and Neck Exam, and Xerostomia/Hyposalivation Assessment

- Intraoral: Hard tissue exam, soft tissue exam, and periodontal exam including probing and/or attachment loss. Temporomandibular complex (TMC) and occlusal evaluation are included.
- Extraoral: Head and neck exam checking for lymphadenopathy, salivary gland assessment, TMC evaluation
- Xerostomia/Hyposalivation Assessment

Chairside clinical observations indicative of possible hyposalivation (Fig 1):

- Lack of pooling of saliva in the floor of the oral cavity.
- Adherence or 'sticking' of a gloved finger or the back of a mouth mirror to the tongue or buccal mucosa.

- A deeply fissured or lobulated tongue can indicate insufficient salivary flow (Fig. 1a).
- Occurrence of cervical caries in more than three teeth (Fig. 1b).
- Lack of clear fluid flowing from Stensen's duct on 'milking' the parotid gland.
- Salivary gland enlargement.

Chairside patient questions to aid detection of hyposalivation and SjD:

- Does your mouth feel dry?
- Do you have difficulty in swallowing certain foods?
- Does food stick in your mouth or throat?
- Can you eat a dry cracker without water?
- Do you have difficulty in speaking?
- Has your taste sensation reduced?
- Do you keep a glass of water at your bedside at night?
- Do you get up at night to drink water?
- Do your lips get chapped or cracked often?
- Do you chew gums or suck candies or cough drops to relieve dry mouth?

Additional objective evaluation is required if a patient says 'yes' to three or more of the aforementioned questions. The assessments should include sialometry, to more accurately distinguish xerostomia from salivary hypofunction. A labial salivary gland biopsy, salivary gland imaging and a blood test for suspected autoimmune disorder like SjD should be considered. These procedures are discussed in the following sections. A referral to a rheumatologist would be appropriate for further work-ups when SjD is suspected.

Sialometry

Because "oral dryness" is a component of many conditions, and oral dryness does not always indicate salivary hypofunction, an objective measurement is necessary. The saliva expressed is measured over a predetermined time, and the flow rate is calculated mathematically, usually in ml/min. Additionally, an oral Schirmer's test can also be done for purposes of clinical screening.

When salivary gland function is below the expected range, it is considered as salivary hypofunction. In healthy non-medicated adults, the average normal stimulated salivary flow rate is 1.5-2.0 mL/min and the unstimulated salivary flow rate is about 0.3–0.4 mL/min. There is an individual variation in flow rates. Salivary hypofunction is an unstimulated whole salivary flow rate (UWSFR) of less than 0.1 mL/min and a stimulated whole salivary flow rate (SWSFR) of less than 0.7 mL/min.

Oral and maxillofacial imaging

- Routine images appropriate to examine dentition and supporting oral structures are important to diagnosing caries, bone levels, lesions, tumors, etc. Additional

specific imaging is used for SjD pathology. These could include conventional sialography of the major salivary gland(s) of interest, magnetic resonance sialography (MR sialography), scintigraphy with $^{99m}$Tc-pertechnetate, MRI, and ultrasound.

- Sialography is a radiographic technique that allows two-dimensional visualization of the ductal system of the major salivary glands using radiography after injection of a contrast medium. It shows collections of contrast material due to ductal dilatation or extravasation of contrast dye into glandular parenchyma. A lack of the normal ductal branching pattern can be observed as well. Due to the risk of infection, complications, and radiation exposure, sialography was removed from the revised 2016 American College of Rheumatology/European League Against Rheumatism (ACR-EULAR) classification criteria (Table 1). While used for many years for diagnosing SjD, safer and less invasive sialographic alternatives can be utilized.
- MR sialography can identify early changes within glands without injection of contrast medium. MRI provides more information on pathological changes in the parenchyma than MR sialography. Characteristic MRI findings include heterogeneous signal-intensity distribution on T1- and T2 weighted images, a so-called "salt and pepper" appearance. In advanced stages, cystic changes may be found due to glandular destruction and fibrosis.
- SGUS is becoming more frequently used as it is easily performed, non-invasive, and less costly than other modalities. The parotid and submandibular glands bilaterally are visualized in longitudinal and transverse planes. The drawback to use of SGUS is the lack of clearly defined and internationally accepted scoring criteria. Research is ongoing in this area. Interpretation by a skilled clinician can delineate normal salivary gland which is uniformly hyperechoic and homogeneous tissue from diseased. Glands that are hypoechogenic and nonhomogeneous with focal or diffuse hypoechoic or anechoic foci can be found in SjD. Submandibular glands may become atrophic or parotid glands may become enlarged during disease flares.
- Scintigraphy is a nuclear imaging technique that evaluates gland function by uptake and secretion patterns of the radioactive tracer, Technetium-99 m pertechnetate. In the past, a positive finding was part of classification criteria for primary SjD. It was removed from the 2016 criteria due to low specificity. It may be helpful in determining the degree of disease but less so for diagnostic purposes.

Serological considerations

In the diagnosis of autoimmune connective tissue disorders, immunofluorescence-based testing for anti-nuclear antibodies (ANA) is highly relevant. Many patients with primary SjD test positive for ANA. In addition, seemingly healthy individuals can also test positive for ANA, and the prevalence of ANA is more common in females than males. The hallmark autoantibodies in primary SjD are anti-SSA/Ro and anti-La/SSB. Serological results in SjD may vary and overlap with other autoimmune disorders such as SLE. Common immunologic findings for SjD ANA, which is frequent but less specific. Anti-SSA and anti-SSB are considered the

hallmark auto-antibodies and range 40%-70% and 23%-52% positivity, respectively. Anti-SSA/Ro positivity and the positive labial salivary gland histopathological findings are the most reliable criteria for SjD diagnosis. Serological interpretation and diagnosis are performed by the rheumatology or internal medicine team. Findings should be shared with the oral health team.

## Diagnostic criteria

Over the past several decades, many diagnostic criteria have been applied to SjD.

- The Copenhagen criteria, which was proposed in 1986, included objective evidence of keratoconjunctivitis sicca, salivary gland involvement and whole unstimulated salivary flow.
- The European classification criteria, which was initially proposed in 1996 and later revised in 2002 by the American-European consensus group (AECG) (Table 1).
- The International Collaborative Clinical Alliances Cohort criteria was initially proposed in 2012 by the Sjogren's International Collaborative Clinical Alliances Cohort.
- ACR Board of Directors and EULAR) Executive Committee updated and approved the criteria in 2016. The final classification criteria are based on the weighted sum of five items (Table 1).

## Procedures/materials needed

### Sialometry

Sialometry is an objective measurement of salivary flow rate that can aid the oral health care team in determining the patient's hyposalivation and caries risk assessment Salivary hypofunction can promote oral candidiasis and dental caries. The crucial caries preventive actions of saliva are decreased because of salivary hypofunction. These actions involve salivary flow rate for flushing of organisms from the mouth and buffer effects for neutralization of the harmful effects of acids. When salivary gland function is below the expected range, it is considered as salivary hypofunction. In healthy non-medicated adults, the average normal stimulated salivary flow rate is 1.5–2.0 mL/min and the unstimulated salivary flow rate is about 0.3–0.4 mL/min. There is an individual variation in flow rates. Salivary hypofunction is UWSFR of less than 0.1 mL/min and SWSFR of less than 0.7 mL/min. The risk of developing dental erosions is considered to be five times more frequent in patients with UWSFR $\leq$ 0.1 mL/min. In spite of good oral hygiene, patients with SjD experience dental caries and tooth loss.

Unstimulated Sialometry: Materials Needed

- Accurate scale
- Pre-weighed sample collection tube
- Timer
- Funnel

Stimulated Sialometry: Materials Needed

- Accurate scale
- Pre-weighed sample collection tube
- Timer
- Sterile paraffin wax
- Funnel

For the most accurate evaluation of salivary flow rate, the patient should refrain from eating, drinking, smoking, or chewing gums for a minimum of 1 h before saliva collection. Patients can drink water during this period. When both SWSFR and UWSFR are planned to be determined during the same appointment, the UWSFR measurement should be done first, allowing for at least a 15- minute rest period before determining SWSFR.

To measure the patient's UWSFR, the patient is instructed to sit straight with their head tilted slightly forward, without talking or chewing, and expectorate (drool or spit) into a pre-weighed sample collection tube for a preset period (1015 min). After sample collection, the tube is weighed and the difference is calculated. The difference in weight is divided by the number of minutes for collection to determine the rate of flow (mL/min). It is assumed that saliva is similar to water, where 1 g of water/saliva at 4 °C equals 1 mL of saliva/water. As UWSFRs can be below normal even when the stimulated flow remains unaffected, the UWSFR measurement can be a more critical parameter than stimulated flow rate for SjD diagnosis.

To assess the patient's SWSFR, the patient is instructed to sit with their head tilted slightly forward and chew on a small square piece of sterile paraffin wax for a preset period (~ 10 min). The patient is also instructed to expectorate the saliva produced into a pre-weighed sample collection tube or container. Saliva expectoration can be done at intervals of 30 s or 1 min. After collection, the tube is weighed again and the flow rate is calculated by dividing the difference between the weights of the tube by the number of collection minutes. The measured SWFSR is then compared to the normal stimulated salivary flow rate, which is greater than 0.7 mL/min.

A screening test for salivary hypofunction can also performed by placing a calibrated filter paper (Whatman no.41) in the floor of the mouth. After 5 min, the length of wetness is assessed. Occasionally, it is known as an oral Schirmer's test because of the similarities with the method utilized by ophthalmologists to measure tear film wetness. The oral Schirmer's test is easy to perform, objective and useful. However, the cut-off values for dry mouth vary significantly depending on the site of the oral cavity and the duration of placement in studies.

## Labial Salivary Gland Biopsy

A labial salivary gland biopsy, usually performed on the lower lip, has long been used as a key diagnostic criterion for SjD. The labial salivary gland biopsy is included in all sets of primary SjD criteria since 2002 (Table 1). It can be particularly useful in patients with negative or inconclusive autoantibody profiles and glandular dysfunctions. Focal lymphocytic sialadenitis is a major feature seen in the histopathology of a minor salivary gland in SjD. Infiltrates around striated ducts mainly consisting of B- and T-lymphocytes, and some plasma cells are observed. It is characterized by the presence of periductal lymphocytic clusters (50 lymphocytes) adjacent to normal-appearing mucous-secreting acini. The number of lymphocytic aggregates per $4mm^2$ of glandular tissue section is termed as the "focus score". A focus score of $\geq 1$ is the validated criterion for the identification of SjD (Fig. 2). If the diagnosis does not indicate SjD, the labial salivary gland biopsy can show other types of glandular inflammation like sarcoidosis or chronic sialadenitis.

Labial Salivary gland biopsy: Materials needed

- Local anesthetic
- Surgical blade holder and blade
- Sterile pick-ups
- 10% formalin fixative specimen bottle
- Resorbable sutures

The lower lip has numerous minor salivary glands that can demonstrate a typical histopathologic pattern in SjD patients. In the everted lower lip, salivary glands are easily accessible just below the surface. Following local anesthesia infiltration, a 5 mm incision is made in the right or left side of the midline in the inner mucosa of the lower lip (Fig. 3). About 5–7 lobules of accessory salivary glands are harvested. The specimen is placed in 10% formalin fixative and transported to a trained pathologist. Resorbable sutures are used to close the incision. The patient should be informed to expect some tenderness and discomfort for some days following the procedure. Pathologists that specialize in oral pathology, particularly salivary gland pathology, should interpret the labial salivary gland biopsy. Focal lymphocytic sialadenitis is a major feature seen in the histopathology of a minor salivary gland in SjD.

## Laboratory/ serological considerations

The oral health care team may send the patient to a lab for a blood draw, but more likely they will refer to the patient's primary care physician or rheumatologist. In the diagnosis of autoimmune connective tissue disorders, immunofluorescence testing for ANA is highly relevant. Serological interpretation and diagnosis are performed by the rheumatology team. Anti-SSA/Ro positivity and the positive/supportive labial salivary gland histopathological findings are the most reliable criteria for SjD

diagnosis as reflected by the 2016 ACR/EULAR Sjögren's classification criteria. It is important to keep it mind, though, that negative anti-SSA/Ro or negative labial salivary gland biopsy does not exclude a possibility of SjD diagnosis.

### Salivary gland enlargement and lymphoma

Approximately, one-third of SjD patients demonstrate gland enlargement. It can be chronic or episodic and can occur unilaterally or bilaterally. If the gland enlargement is unresponsive to short-term therapy, additional evaluation is required to rule out the possibility of B-cell non-Hodgkin's lymphoma (NHL), also called so-called MALT lymphoma. NHL occurs in about 5% of patients with primary SjD, and can occur in the parotid gland. The B-cell type NHL is a low-grade lymphoma, which is commonly slow-growing and responds well to treatment. In SjD patients, the predictors for NHL are cryoglobulinemia, monoclonal gammopathy and C4 hypocomplementemia.

## Complications/pitfalls

### Sialometry

- If the patient did not receive or did not comply with the pre-procedure instructions, results could be inaccurate.

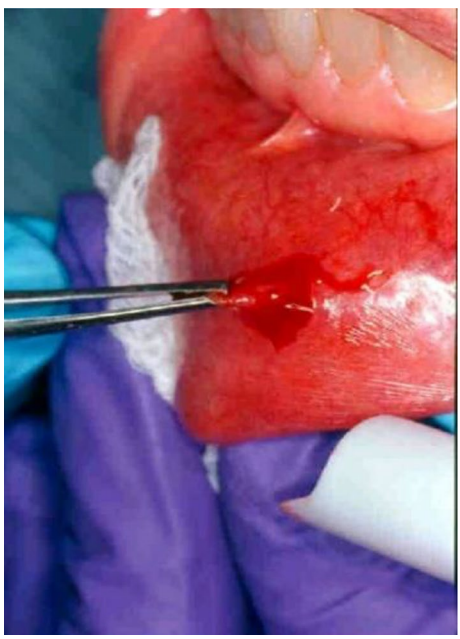
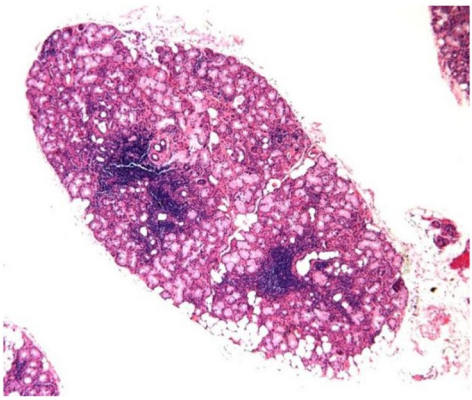
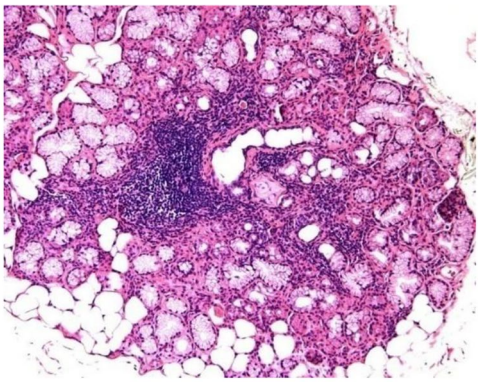


**Fig. 2** Labial salivary gland biopsy procedure demonstrating harvesting accessory salivary gland lobule



**(a)** *Labial salivary gland biopsy demonstrating distinct focal lymphocytic clusters H&E 10X,*



**(b)** *Lymphocytic focus surrounding duct, with normal-appearing adjacent acini, H&E 20X. (Both photos taken by Dr. Indraneel Bhattacharyya).*

**Fig. 3** Histopathology for labial salivary gland biopsy supportive of SjD diagnosis. **a** Labial salivary gland biopsy demonstrating distinct focal lymphocytic clusters. **a** Labial salivary gland biopsy demonstrating distinct focal lymphocytic clusters H&E 10X, **b** Lymphocytic focus surrounding duct, with normal-appearing adjacent acini, H&E 20X. (Both photos taken by Dr. Indraneel Bhattacharyya)

- The unstimulated salivary flow rate can be falsely elevated if the patient had a meal, soda, candy, or chewed gum within the hour to the sialometry procedure.
- For the unstimulated sialometry, the patient should be advised that the procedure is not a "contest" to produce as much saliva as possible. The patient should be comfortable and relaxed and allow the saliva to naturally flow from the mouth.

**Labial salivary gland biopsy**

- Unanticipated prolonged bleeding and/or infection can occur.
- Resorbable sutures might not dissolve, and the patient must return for suture removal.

- Following a labial salivary gland biopsy, 1–2% of patients can experience some numbness or tingling of the lip for 2–3 months following the procedure. Rarely, partial lip numbness or altered lip sensation can persist for six months or more.
- Inadequate sampling can result in an incorrect finding. If the procedure is performed by a surgeon not familiar with this procedure, inadequate sampling may occur. Too often, an insufficient number of salivary gland lobules are harvested.
- The histopathology may be incorrectly interpreted by a pathologist unfamiliar with the histopathology of oral salivary glands and criteria for a SjD-positive diagnosis.

**Medical oversight**

- Because symptoms for SjD cover a such wide spectrum involving many organ systems with diverse symptoms and pain complaints, it is not uncommon for a patient to initially receive an inappropriate or incomplete diagnosis. Patients often seek consultation with several physicians before receiving an appropriate treatment plan.

## Further Reading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