

Clinical Report/Klinische Arbeit

Salivary Gland Scintigraphy

Diagnostic Verification of Parotid Saliva Flow through the Maxillary Sinus and Nose

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Summary. The diagnostic value of salivary gland scintigraphy in patients without access to the salivary gland duct orifice is exemplified and discussed. The necessity for careful dental examination and treatment in patients with an oro-antral fistula is emphasised.

Key words: Salivary glands – Scintigraphy – Diagnostic value.

Roentgenologic and sialometric examination of a single salivary gland presupposes accessibility to the excretory duct orifice (Enfors, 1962; Ericson, 1973), but both scintigraphic examination of the salivary glands and radiosialometric estimation of their functional capacity are possible without access to the excretory duct (Ancrì, 1973; Gates, 1972; Lind and Söderborg, 1971; Eneroth and Lind, 1976a; Eneroth and Lind, 1976b; Schall and Di Chiro, 1972).

This report describes an unusual surgical complication verified by salivary gland scintigraphy and not possible to demonstrate by sialography.

Patient

Man aged 35, no earlier diseases of importance. In June 1974 tooth 16 was extracted and a fistula developed between the oral cavity and the maxillary sinus. Between August 1974 and October 1975 the patient was operated six times with a buccal flap according to Rehrmann in order to close the fistula (Rehrmann, 1936; Baumann, 1975). The fourth operation in November 1974 included a large resection of the lateral wall of the fistulous alveol. Each time the fistula reappeared around a week after operation. As radiography revealed the retention of tooth 18 as well as the retention of the fractured apex of tooth 16, these teeth as well as tooth 17 were extracted in October 1975, and a buccal flap was used to cover the extraction cavities. The fistula then healed.

Since January 1975, the patient complained from time to time of more or less pronounced rhinorrhea from the right nostril, generally appearing in connection with meals. During the autumn 1975, he became more bothered by this symptom and radiography of the sinuses demonstrated that the right maxillary sinus was opaque. It was suggested that the rhinorrhea was caused by saliva excreted from the right parotid gland into the right maxillary sinus and subsequently into the nasal cavity. This abnormality could be explained as a surgical complication to the repeated buccal flaps and the resec-

tion of the lateral wall of the alveol and lower part of the maxillary sinus. There might have been an accidental transposition of the orifice of the right parotid duct into the maxillary sinus.

At examination it was found impossible to identify the parotid duct orifice in the right buccal region. This could be explained either by the scar tissue concealing the orifice or by a transposition of the orifice into the maxillary sinus. As the orifice was not found, it was not possible to examine the gland and its duct with sialography in order to verify such a transposition of the orifice.

Scintigraphy of the salivary glands was then performed with a gamma-camera. 1.0 mg atropine sulphate was slowly injected intravenously immediately before examination in order to obtain an inhibi-

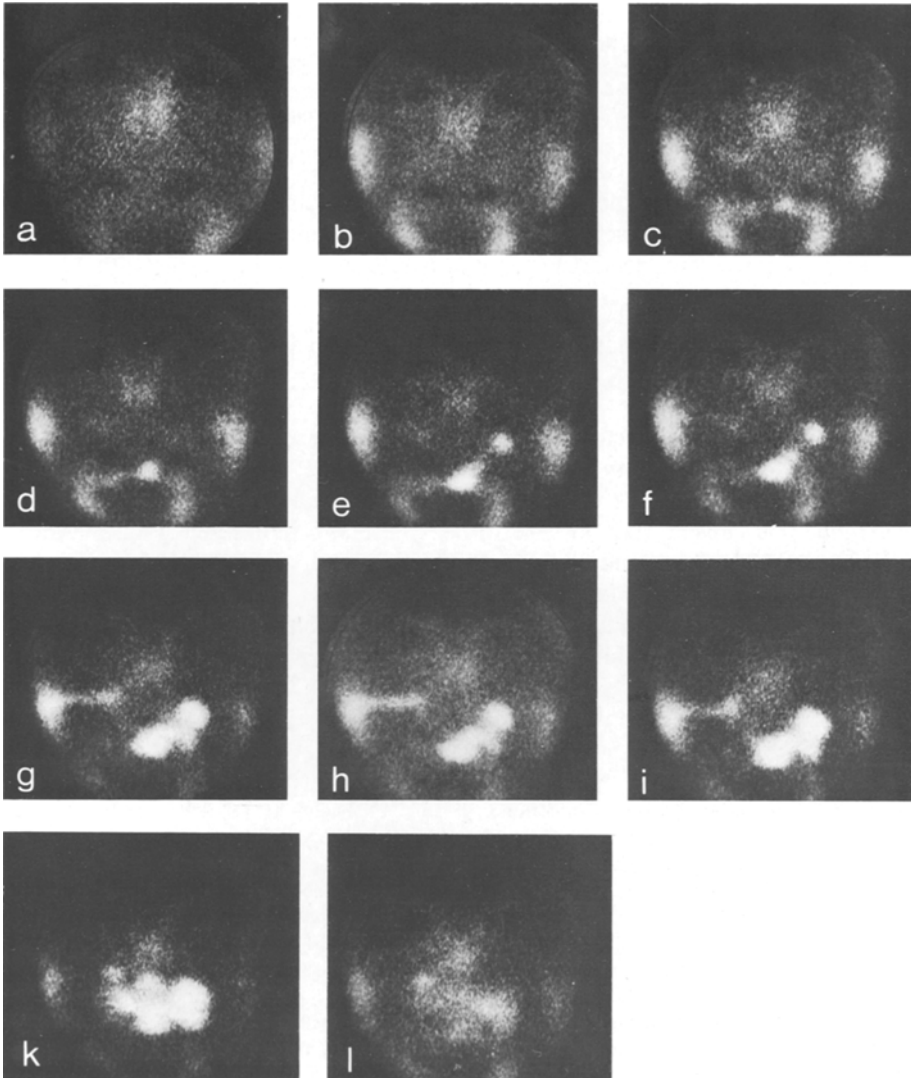


Fig. 1a-l. Consecutive salivary gland scintigrams from 3 min to 2 h after injection of 2.0 mCi $^{99}\text{Tc}^{\text{m}}\text{O}_4$. Frontal projection. For details — see the text

tion of the salivary flow. This should increase the saliva concentration of Technetiumpertechnetate ($^{99}\text{Tc}^{\text{m}}\text{O}_4$) and decrease the contamination of the oral cavity with saliva containing $^{99}\text{Tc}^{\text{m}}\text{O}_4$ (Enfors et al., 1969; Ancri, 1973; Harden et al., 1968). Compresses were placed against the buccal surfaces and under the tongue also in order to decrease the contamination of the oral cavity with $^{99}\text{Tc}^{\text{m}}\text{O}_4$ containing saliva (Eneroth et al., 1971; Eneroth and Lind, 1976a). 2.0 mg $^{99}\text{Tc}^{\text{m}}\text{O}_4$ was then injected intravenously and the parotid parenchyma accumulation of the isotope was followed by repeated gamma-camera examinations of the face region in a frontal projection. After 20 min, the salivary flow was stimulated by 6% citric acid dropped on the tongue. The consecutive scintigraphic images clearly demonstrated the initial accumulation of $^{99}\text{Tc}^{\text{m}}\text{O}_4$ in the parenchyma of the salivary glands (Fig. 1a, b) and the transport of the tracer by the saliva flow from the submandibular glands to the floor of the mouth (Fig. 1c, d). Later $^{99}\text{Tc}^{\text{m}}\text{O}_4$ was transported from the left parotid gland to the left bucca (Fig. 1e, f) and finally the saliva from the right parotid gland was shown to flow horizontally through the maxillary region to the nasal cavity (Fig. 1g, h, i). After 2 h, most of the tracer in the facial region was found in the compresses placed in the mouth, with larger amounts in the left buccal cavity than in the right buccal cavity (Fig. 1k). These compresses were removed and most of the activity in the region of the mouth then disappeared (Fig. 1l). The amount of $^{99}\text{Tc}^{\text{m}}\text{O}_4$ in the compresses was examined by a well counter and the left buccal compress was found to contain five times as much $^{99}\text{Tc}^{\text{m}}\text{O}_4$ as the right buccal compress. After further stimulation with citric acid, secretions from the right and left nostrils were collected on absorbing paper. These papers were then examined by the gamma-camera. No activity was demonstrated in secretions from the left nostril but high activity was found in the secretions from the right nostril, which further supported the hypothesis of a salivary flow through the nose via the maxillary sinus.

The fistula healed after the operation, that included the tooth extractions, but the patient suffered from his saliva rhinorrhea and avoided eating in company because of the sometimes copious salivary flow from the nose, dropping on the table, when he leaned forward to eat. As the salivary flow through the nose was proven and the patient's social life suffered from his saliva rhinorrhea, a seventh operation was decided in order to ligate the parotid gland duct on the right side, despite the risk of a recurrence of the fistula. The operation offered some technical difficulties because of scar tissue. After operation, the fistula remained closed and the secretion through the nose disappeared. The patient one year after operation is still without symptoms from the area.

Discussion

Diagnosis of salivary gland disorders is based mainly on either morphological considerations (palpation, sialography, fine needle biopsy, histology) or on estimation of functional impairment (history, sialometry, chemical analysis of saliva, radiosialometry) (Eneroth and Lind, 1975). Scintigraphy of the salivary glands offers morphological as well as functional parameters (Ancri, 1973; Gates, 1972; Schall and Di Chiro, 1972). However, tumours causing irregular accumulation of the tracer in the salivary gland parenchyma, possible to detect by scintigraphy, are in general large enough to be palpated and examined by fine needle biopsy. Therefore, in such cases, scintigraphy is of limited value (Schall and Di Chiro, 1972; Eneroth and Lind, 1975). General affections of the parotid glands, such as chronic sialoadenitis, might cause an abnormally low capacity to accumulate $^{99}\text{Tc}^{\text{m}}\text{O}_4$ (Schall and Di Chiro, 1972; Eneroth and Lind, 1976a; Eneroth and Lind, 1976b). Therefore the accumulation capacity examined quantitatively by radiosialometry can be used to separate patients with chronic sialoadenitis from individuals with a normal parotid gland function (Lind and Söderborg, 1971; Eneroth and Lind, 1976a; Eneroth and Lind, 1976b; Eneroth et al., 1971).

As sialometry as well as sialography presupposes access to the orifice of the parotid duct it was not possible to use these diagnostic methods in order to verify the

unexpected flow of saliva through the right nostril. Because of the difficulties in closing the oroantral fistula, a seventh operation in the region would not have been performed without a very strong indication. The repeated scintigraphic examinations and the measurements of the amount of $^{99}\text{Tc}^{\text{m}}\text{O}_4$ in the secretions were therefore of great value, demonstrating the saliva passage from the right parotid duct through the maxillary sinus to the right nostril.

The scintigraphic images clearly demonstrate the value of inhibited, controlled salivary flow during scintigraphic examination of the salivary glands (Fig. 1).

Atropine sulphate inhibits the salivary flow and partly because of the compresses in the oral cavity the different stages of the secretion process can be followed. The late accumulation of $^{99}\text{Tc}^{\text{m}}\text{O}_4$ in the mouth region is build up by the $^{99}\text{Tc}^{\text{m}}\text{O}_4$ containing saliva, secreted into the oral cavity as shown by the last two images (Fig. 1k, l) (Enfors et al., 1969). The saliva was absorbed into the compresses filling the mouth and when these were removed, scintigraphy demonstrated a much smaller accumulation in the mouth region (Fig. 1l).

The patient here reported also demonstrated the necessity for a careful control of dental root infections in the region of an oro-antral fistula (Thoma, 1963; Baumann, 1975; Mårtensson, 1952). Initially, the fistula was caused by the extraction of tooth 16 because of apicitis. Surrounding teeth may be infected as well and a fistula is not likely to heal if the osteitic process remains uncontrolled.

In this patient, after five trials, the fistula healed immediately after the extraction of the slightly affected neighbouring teeth and the small fractioned apex remaining after the extracted tooth 16.

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Received July 6, 1977