

THE VALUE OF SIALOGRAPHY IN THE DIAGNOSIS OF PAROTID TUMOURS*

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During 1949 a retrospective review of 40 mixed tumours of the major salivary glands revealed that 15% had been misdiagnosed as chronic lymphadenitis or sebaceous cysts.⁸ Similar reports from other institutions^{1,20} confirmed the need for greater accuracy in the diagnosis of parotid tumours and although there were, at that time, conflicting views about the value of sialography,⁵⁻⁸ it was decided to investigate its value in the diagnosis of such tumours. Since then sialography has been performed as a routine and 70 sialograms performed on patients with tumours of the parotid salivary glands are reviewed here. This is a selected group of patients because it includes only those cases in whom the exact situation and nature of the tumour have been confirmed by surgical exploration or autopsy, and histological examination.

The pathological nature of these 70 tumours was as follows:

Benign (50): mixed tumour, 34; recurrent mixed tumour, 7; adenolymphoma, 5; oxyphil-cell adenoma, 1; neurofibroma, 1; haemangioma, 1; and lipoma, 1.

Malignant (20): mixed tumour, 2; carcinoma, 14; recurrent carcinoma, 2; and sarcoma, 2.

VALUE OF SIALOGRAPHY

Sialography is based on the concept that a tumour in the salivary gland will interfere with the intra-glandular ducts and that this will be visible on the sialogram. This has been amply confirmed in this investigation and only 1 of these 70 tumours could not be recognized on sialography. This sialogram was performed at the commencement of this series, when I was inexperienced in the technique, but now there is no doubt in my mind that every parotid tumour, sufficiently large to present clinically, can be demonstrated by means of an adequate sialogram. The effect produced by the tumour on the intra-glandular ducts will depend on the type of neoplasm. Broadly speaking we can divide these tumours into 2 big groups: those which are encapsulated and those which invade the surrounding glandular parenchyma. In general the encapsulated tumours are benign and the infiltrating ones are malignant, but this is not always true⁹ and consequently it is not always possible to determine the histological nature of a given tumour by means of sialography.

ENCAPSULATED TUMOURS

Encapsulated tumours displace surrounding structures with the result that the intra-glandular ducts will be seen to

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curve around the tumour without being invaded. These ducts will consequently not be obstructed or damaged and they will be seen in their entirety.

Benign Mixed Salivary Tumours

In the present series, 26 of the 34 clinically benign mixed salivary tumours demonstrated this feature. In 22 cases the duct displacement could be seen on the antero-posterior view, which revealed that the tumour was very superficial in 4 cases (Fig. 1), in the body of the gland in 6 (Fig. 2), and deeply placed in 12 cases (Fig. 3). In most of these the tumour was also visible on the oblique view (Fig. 4), but it is not always seen on this view. In 4 instances the tumour was only recognizable on the oblique picture and not on the antero-posterior view (Figs. 5 and 6); this illustrates the necessity of taking both these views in every case.

All other encapsulated tumours will naturally give similar sialographic appearances and the other 9 primary benign tumours in this series could not, by means of sialography alone, be differentiated from the more common mixed tumours. In addition, other localized, encapsulated lesions will produce a similar picture, and during this investigation 3 branchial cysts,⁸ 3 lymphomata and 4 cases with chronic lymphadenitis of the parotid lymph nodes⁹ have been seen, which all displaced ducts in this way and simulated benign encapsulated neoplasms.

Superficial Tumours

Tumours on the outskirts of the parotid salivary gland do not displace the intra-glandular ducts sufficiently to be visible on a sialogram and such peripherally placed neoplasms will thus be missed unless special precautions are taken. The very superficial tumour produces a small indentation of the surface of the gland which can only be seen on a special acinar-filling sialogram. This requires a repeat injection of a larger volume of contrast medium to fill the acini of the gland which then becomes visible as a diffuse opaque structure on the sialogram.^{5,11-13,16} The tumour appears as a superficially-placed filling defect in this opacity and, in the present series, 6 of the benign mixed salivary tumours could be demonstrated by this method only. In 5 instances the filling defect was apparent on the antero-posterior view (Fig. 7) and in 1 case only on the oblique view.

Other superficially-placed encapsulated lesions will naturally produce a similar filling defect and during this investigation 2 lymphomata and 3 instances of chronic lymphadenitis of the parotid lymph nodes were encountered with identical sialographic appearances.

It is obvious that if a suspected parotid tumour is not

demonstrated on the more orthodox type of sialogram, a special acinar-filling picture must be obtained to exclude a very superficial neoplasm. It must, however, be kept in mind that such acinar filling obscures the detail of the intra-glandular ducts² and may thus disguise ductal displacement due to a neoplasm. For this reason it is important that this method should not be used until the routine ductal pictures have been studied.

Deep Tumours

A tumour on the deep aspect of the gland also does not distort the intra-glandular ducts but pushes the whole gland laterally. Such displacement may be very difficult to recognize, and while the many fallacies and pitfalls of measurements in radiology are appreciated, experience so far indicates that the normal gland and main duct should not be more than 18 mm. and 17 mm. respectively

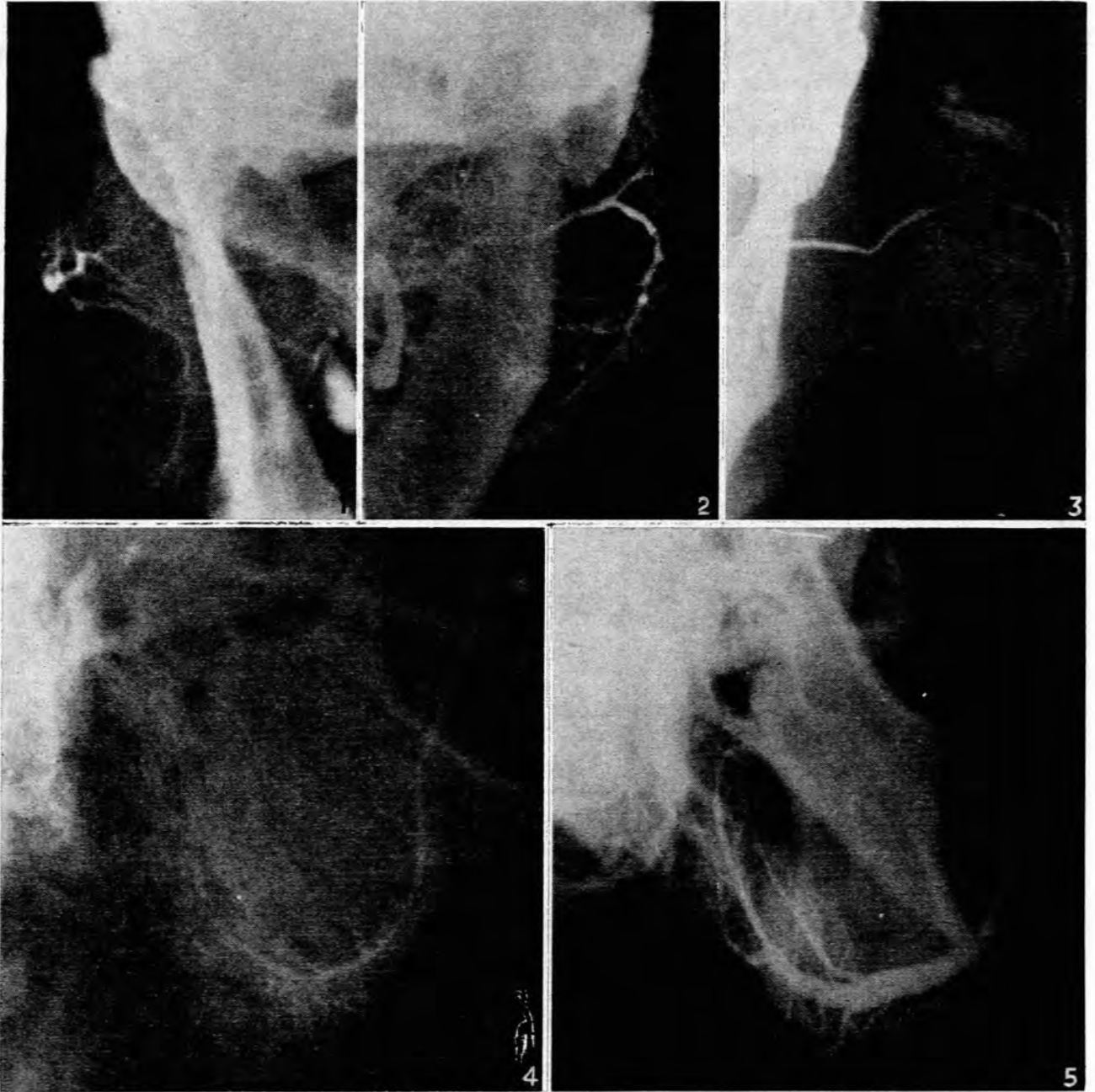


Fig. 1. Displacement of ducts by a superficial mixed salivary tumour.

Fig. 2. Displacement of ducts by a mixed salivary tumour in the middle of the parotid salivary gland.

Fig. 3. Displacement of ducts by a deeply placed mixed salivary tumour.

Fig. 4. Displacement of ducts by a mixed salivary tumour demonstrated on an oblique view.

Fig. 5. Duct displacement by a mixed salivary tumour as seen on the oblique view.

from the lateral edge of the ascending ramus of the mandible on the antero-posterior view. Displacement of either beyond these arbitrary limits is at present considered abnormal and in one instance in the present series this was

the only feature which enabled the diagnosis of such a deeply placed mixed salivary tumour to be made (Fig. 8).

Lesions of the deeply placed parotid lymph nodes and of the ascending ramus of the mandible will also displace

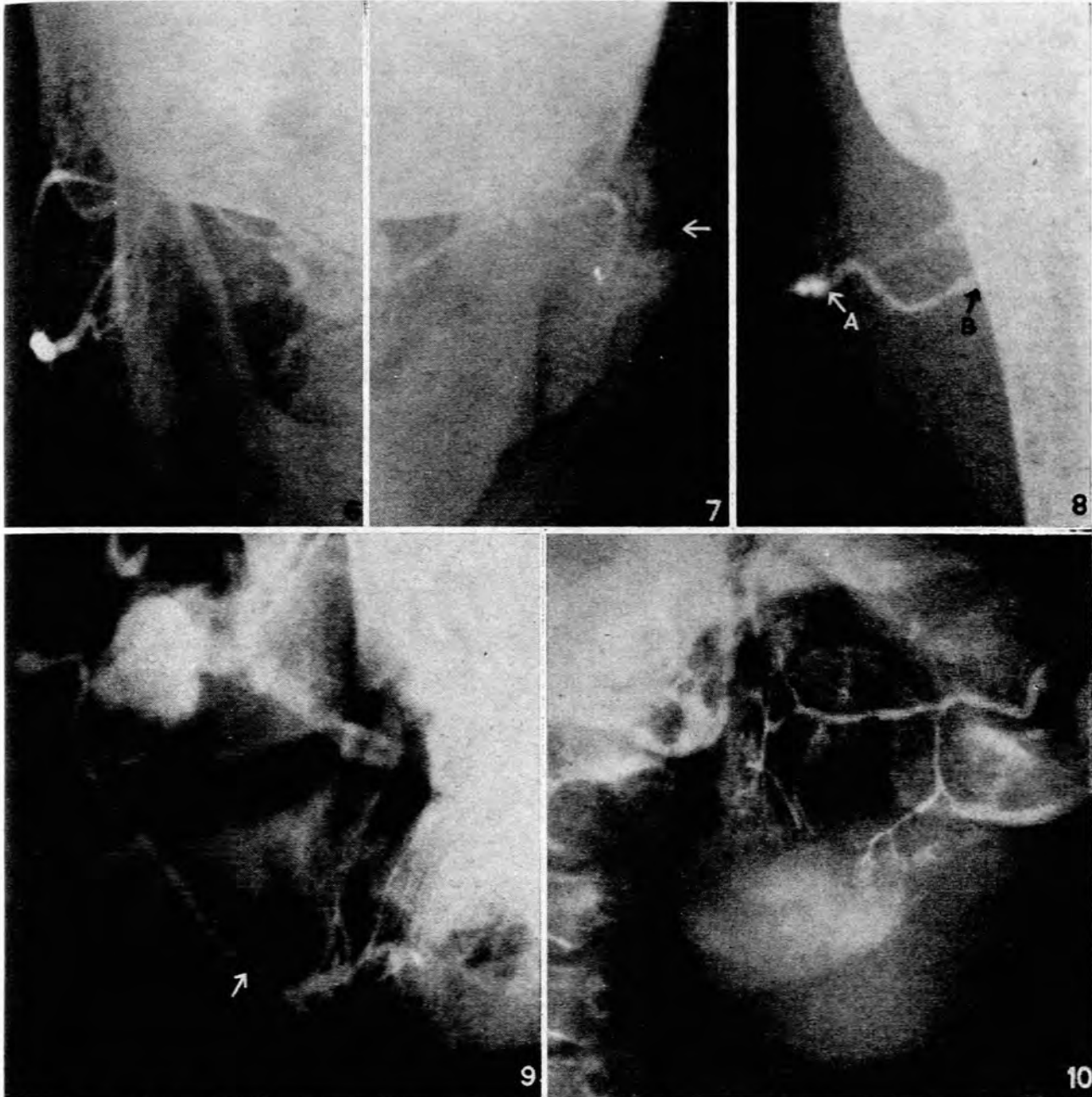


Fig. 6. An A.P. view of the same case as Fig. 5, showing an apparently normal picture.

Fig. 7. Filling defect caused by a very superficially placed mixed salivary tumour as seen on the A.P. view of a special acinar-filling sialogram. (Arrow points to filling defect.)

Fig. 8. A very deeply placed mixed salivary tumour which has pushed the whole gland laterally without obvious intra-glandular ductal displacement. A=main duct, B=lateral edge of ascending ramus of the mandible. Distance between A and B is more than 17 mm.

Fig. 9. Narrowing of an intra-glandular duct with proximal ductal distension produced by a carcinoma. (Arrow indicates narrowing.)

Fig. 10. A carcinoma producing displacement of some ducts but complete obstruction of others.

the parotid salivary gland outwards in this manner. The former conditions cannot be differentiated on the sialogram but disorders of the mandible will, of course, be recognizable on the radiograph, as happened in two instances during this investigation. In the one case there was an osteomyelitis and in the other an osteogenic sarcoma of the mandible.

Encapsulated Malignant Tumours

The sialographic appearance of encapsulation is unfortunately not synonymous with benignity and in this series 10 of the 18 primary malignant tumours (56%) simulated encapsulated tumours on the sialograms. These cases can be divided into 3 groups:

1. Three cases were very slow-growing malignant neoplasms which merely displaced the intra-glandular ducts. They were all slow-growing, well-differentiated carcinomata of 7 years, 3 years and 18 months duration respectively. All 3 tumours were resectable.

2. Five cases were very early carcinomata with an average duration of 3 months. These were still so localized that the neighbouring ducts had not yet been invaded^{2,10} and the sialograms showed only duct displacement of the intra-glandular ducts in 4 instances and of the main extra-glandular duct in 1.⁶ Four of these 5 tumours were resectable but the other one could not be completely removed.

3. The 2 sarcomata also resembled encapsulated tumours on sialography; this is not surprising in view of the well-known tendency for a soft-tissue sarcoma to form a pseudo-capsule by compression of the surrounding structures. This false capsule is responsible for displacing the intra-glandular ducts to give the sialographic appearance of an encapsulated tumour.

Secondary malignant deposits in the parotid lymph nodes also merely displace the intra-glandular ducts during the early stages, before the malignancy has burst through the lymph-gland capsule to invade the surrounding tissues. During this investigation duct displacement only was found in 3 such cases (2 secondary carcinomata and 1 secondary melanoma) and in 1 other case with a metastatic carcinoma a filling defect in an acinar-filling picture was seen.

INFILTRATING TUMOURS

Once a neoplasm invades the intra-glandular ducts, this will be evident on the sialogram in addition to the displacement of ducts. A confident diagnosis of malignancy can then be made. In this series such evidence was present in 8 of the 18 primary malignant tumours (44%), which is lower than the 62% quoted by Blady and Hocker.² The exact effect on the intra-glandular ducts will depend on the degree and duration of the malignant process.

The earliest sign of invasion is an incomplete obstruction of one of the intra-glandular ducts. Not only can the area of narrowing of the duct be seen, but the duct proximal to this obstruction is distended (Fig. 9). In this type of case a refinement in technique which is of additional value is the secretory sialogram.^{19,24} After the sialogram has been completed the patient sucks a lemon for 1 minute to stimulate salivary secretion which will wash the contrast material out of the ducts. Five minutes later antero-posterior and oblique views are again taken to assess the extent of the emptying of the gland. In

normal glands no contrast material is visible on these 5-minute post-stimulation films. It has been stated¹ that benign tumours produce retention of contrast medium on these special films but this belief has not been confirmed in this series. During this investigation secretory sialography was performed on 28 benign neoplasms in which ductal filling only had been produced with 'neo-hydriol fluid' and in all these cases the ducts were completely empty on the 5-minute post-stimulation films. An additional 6 cases required acinar filling with the same substance and, of these, 4 emptied completely with this technique, but in the remaining 2 cases there was a faint residual cloud of contrast material in the gland.

In this series 3 carcinomata produced incomplete obstruction of an intra-glandular duct with proximal distension and in all 3 cases there was retention of the radio-opaque substance on the 5-minute post-stimulation film. These cases had a varying duration of 3 years, 18 months and 3 months respectively and were all resectable.

Eventually a malignant tumour will destroy one or more ducts completely and this is manifest on the sialogram in two different ways. Either the duct will be completely blocked (Fig. 10), or it may open into a necrotic area which will be seen on the sialogram as extravasation of the radio-opaque material into the tumour (Fig. 11). In this series there were 4 late cases demonstrating these features: 2 were clinically malignant mixed salivary tumours with a duration of 14 and 20 years respectively and the other 2 were carcinomata with a duration of 5 and 2 years respectively. This radiographic appearance was found to indicate an advanced stage of malignancy and of these 4 cases, 2 had distant metastases, 1 had extensive lymphatic invasion and 1 was invading the mandible and the base of the skull.

Once again it is obvious that an advanced malignant metastasis in the parotid lymph glands will also produce a similar effect and during this investigation 1 secondary carcinoma and 1 secondary retinoblastoma were found with duct displacement and complete destruction causing obstruction and extravasation.

In this series there was 1 extremely anaplastic carcinoma with a duration of only 1 month that was so rapidly invasive that it destroyed the intra-glandular ducts without any preliminary displacement—the resultant picture was one of gross duct destruction with extravasation but without any displacement. In spite of the short history there was already significant lymphatic invasion and such a sialographic appearance has a grave prognostic significance. A similar picture was obtained in a patient with an epithelioma of the skin over the parotid gland which invaded the salivary gland by direct spread, but such a condition can be readily diagnosed on ordinary clinical examination.

RECURRENT TUMOURS

Tumours which have recurred following previous operations will naturally produce features similar to those already described, but the operation itself may have damaged the ducts and this may complicate the sialographic picture.

In this series there have been 9 recurrent tumours (2 malignant and 7 benign) and of these 5 produced a sialogram compatible with their pathological natures with-

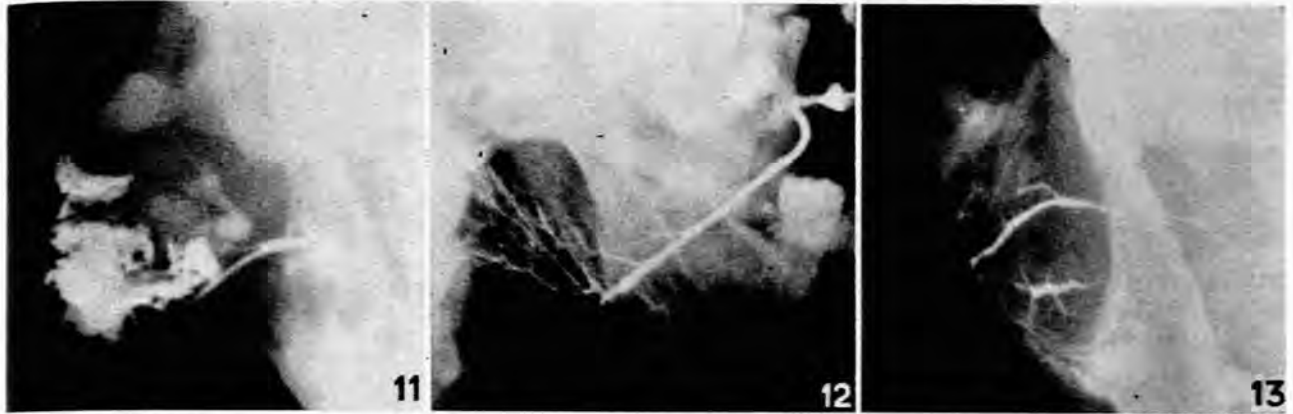


Fig. 11. Extravasation of contrast material into a necrotic carcinoma.

Fig. 12. A recurrent carcinoma producing complete obstruction of a major intra-glandular duct.

Fig. 13. Ductal narrowing and proximal duct distension in a recurrent mixed salivary tumour.

out any evidence of ductal damage resulting from the previous operation. In 1 recurrent adenocarcinoma of 7 years' duration there was destruction and obstruction of the intra-glandular ducts. Of 4 recurrent benign mixed salivary tumours, 3 showed duct displacement seen on the antero-posterior and oblique views and 1 a superficial defect in an acinar-filling sialogram, demonstrated only on the antero-posterior view.

In 4 instances (3 benign and 1 malignant) there was unusual ductal interference, presumably produced by the previous operation. In 2 cases (1 benign and 1 malignant) there was complete obstruction of a major intra-glandular duct which prevented filling of the ducts in a major portion of the gland and consequently no evidence of a tumour could be seen on the sialogram (Fig. 12). In the other 2 recurrences of clinically benign mixed salivary tumours there was displacement of intra-glandular ducts but in addition some stenosis of the ducts with proximal ductal distension (Fig. 13) and delayed emptying on secretory sialograms was seen. This is presumably an effect of invasiveness and it is assumed that it resulted from the damage to the capsule by the previous operation which liberated the tumour into the salivary gland parenchyma as can be seen on histological examination.⁷

DISCUSSION

Sialography can thus be of great assistance to the surgeon who has to deal with a mass in the region of the parotid salivary gland.

It will in every case indicate whether the mass is in the parotid gland or outside it. Every intrinsic mass will be visible on sialography provided the special precautions mentioned in this paper are complied with. Although an extrinsic mass may produce compression or displacement of the gland, the general architectural pattern of the duct system is preserved and there is no localized distortion of the intra-glandular ducts.³ During this investigation sialography has on many occasions indicated that a mass is outside the parotid gland and a false interpretation in this regard has not been experienced.

A sialogram will also indicate to the surgeon the depth of the mass in the gland. This is of very great assistance to the surgeon during the operation because it will make

it easier for him to locate and preserve the facial nerve.

It must, however, be kept in mind that only encapsulation and invasiveness are distinguishable on sialograms and it is impossible to determine with greater accuracy the exact histological type of neoplasm by means of sialography. Generally speaking, benign tumours are encapsulated and malignant tumours are invasive, but this does not always hold good, and it has been shown that 56% of malignant tumours appeared to be encapsulated. If, however, the sialogram reveals some evidence of invasion, then it can be taken as certain that encapsulation is not present. This knowledge is of great value in planning the operation, particularly when the question of preservation of the facial nerve arises.

SUMMARY

A selected group of 70 parotid tumours is reviewed to assess the value of sialography.

It is concluded that sialography will demonstrate an intrinsic neoplasm in every case, provided the investigation is adequately performed.

Various refinements in technique are described which significantly increase the value of sialography.

Sialography can only differentiate between encapsulated lesions and invasive ones and no greater accuracy in diagnosis can be expected.

In this series 44% of primary malignant tumours showed sialographic evidence of invasion. The remainder appeared to be encapsulated but at operation these cases were found to be localized lesions.

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