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Salivary gland tumours*

By CLIVE BUTLER (London)

MY lecture today will dwell principally on tumours of the parotid gland because those in the submandibular gland, although important, do not raise many problems in treatment or diagnosis.

In the past, surgery of the parotid gland fell into a no-man's land; in some centres treatment was carried out by general surgeons, in others by head and neck specialists and occasionally by plastic surgeons.

It wasn't until Mr. Patey and Dr. Thackray, at the Middlesex Hospital, drew attention to the pathology and treatment of parotid tumours in 1953 (Patey, 1953) and 1954 (Patey, 1954), that general interest was aroused and their teaching was undoubtedly responsible for the great improvement in the results which have become evident during the past two decades.

Historically, treatment of parotid neoplasms can be divided into three stages:

At first, simple enucleation was practised, which gave poor results, since rupture of the capsule or the presence of small satellite tumours allowed tumour cells to escape, with a consequent high rate of recurrence.

Then enucleation followed by irradiation was tried, in an effort to kill off any tumour cells which had escaped; this therapy was introduced at The London Hospital by the late Dr. A. Burrows in the 1930s and led, as we shall see, to a reduction of the recurrence rate at that hospital to around 3 per cent. This reduction was probably due to the reduced function in the affected gland and partly to suppression of any tumour cells which had been split during the operatoin.

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Thirdly, as a result of the work of Patey and Thackray, partial removal of the gland became a standard procedure and post-operative irradiation was reserved for a few carefully selected cases.

Total removal of the parotid gland, as practised so successfully in France by Dr. Redon, has never become popular in this country for non-malignant cases. Dr. Redon's work was ably summarized in a paper that he gave at the Royal Society of Medicine in 1953 (Redon, 1953) and, in his hands, the results have been very good, with a minimal amount of facial weakness.

At The London Hospital, we have been fortunate, since the majority of patients with salivary gland tumours came, at one time or another, under the care of the Department of Radiotherapy, so that we have been able to trace over the years not only patients treated at The London, but also those whose surgical treatment had been carried out in hospitals in the North-East Region.

Pathological aspects of tumours of the parotid

In 1954, Patey and Thackray demonstrated by serial sections that multi-focal tumours of the parotid do not exist but that satellite tumours often occur, being linked to the parent tumour by almost invisible strands of tissue. They maintained that recurrences were either due to the rupture of the capsule at operation, or when these small satellites were left behind, and their conclusions are now generally accepted.

The next problem is the relation between simple tumours (adenomas) of the parotid and carcinoma.

Since the recurrence rate of parotid tumours is now about 2 per cent after adequate surgery, one might expect the incidence of deaths from salivary carcinoma to have fallen. A study of the Registrar General's figures over the past twenty years does not confirm this assumption, as the figures have remained almost the same (130–140) over the years. This suggests to us that carcinoma of the salivary glands is usually a primary lesion and that neoplasms arising in a recurrent lesion are unusual. This statement is borne out in the figures from The London, which show that the majority of malignant salivary tumours arise de novo and not at the site of previous or recurrent adenomata.

The other common innocent tumour to arise in the parotid is the adenolymphoma; they are more cystic in nature than the pleomorphic tumours, recurrence is very rare after surgery and malignant change is unknown. Other unusual causes of tumours in the parotid, apart from primary carcinomata, are chronic abscesses, lipomata or secondary lesions from elsewhere, usually the lung.

Three main types of primary malignant neoplasms are found in the salivary glands: carcinoma, cylindroma and sarcoma. We shall discuss the treatment of these lesions shortly.

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Salivary gland tumours

Problems of diagnosis

Tumours of the submandibular gland can usually be diagnosed after a sialogram has shown the absence of a calculus. This investigation should always be carried out before treatment is commenced. We have, however, not found a sialogram to be helpful in cases of parotid tumours. Parotid calculi or sialectasia give definite symptoms, with swelling of the whole gland, but a painless lump in the parotid is in itself a diagnostic feature and a sialogram will only indicate a filling defect in the duct system. Such X-ray appearances would also be seen in all parotid tumours, chronic abscesses or, rarely, secondary tumours from elsewhere, particularly the lung.

The presence of any facial weakness indicates the probable presence of a carcinoma, since we have never seen facial paresis occur with simple tumours, however large.

Reticuloses or auto-immune diseases of the salivary glands (sometimes called Mikulicz disease) can offer difficulties in diagnosis, since these conditions may only affect one gland at a time and sometimes are accompanied, in the case of the parotid, by slight facial weakness. In one patient, I carried out a total parotidectomy since the lady presented with a large parotid swelling and a mild facial weakness. The pathological report showed no carcinoma and, six months later, the other gland swelled up and immediately responded to a course of radiotherapy.

Reticuloses or sarcomas arising in the parotid or from the masseter muscle may also be difficult to diagnose and, in these cases a drill biopsy should always be done to confirm the diagnosis.

In our view, routine drill biopsies on simple parotid neoplasms are not required and may possibly do harm by spilling tumour cells within the gland itself.

Some essential steps in the operation of superficial parotidectomy

The object of this operation is to remove the tumour together with that part of the gland which lies in front of the facial nerve.

In our experience, the tumour generally lies directly on or displaces one or more of the main branches of the nerve; it is, therefore, impractical in most cases to remove a cuff of normal tissue round the tumour without damaging the nerve, which would leave the patient with a permanent facial weakness, a complication which, at all costs, must be avoided in the treatment of non-malignant lesions.

I would next like to emphasize the importance of adequate anaesthesia in these patients. Hypotensive anaesthesia has revolutionized the surgery of the head and neck and has abolished the need for ligation of the external carotid, a measure frequently carried out in the past by some surgeons.

We have found that profound hypotension is not necessary, i.e. blood pressures of 60 mm. or below. A pressure of some 85 to 100 mm. of mercury

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will give all the facilities one needs with a head tilt of about 45 degrees.

The anaesthetic used has been Thiopentone followed by gas and halothane; this has proved satisfactory.

At the end of the operation, the blood pressure should come back to normal before the wound is closed, to prevent the complication of reactionary haemorrhage; a drain must always be left in, attached to some form of continuous suction.

We have found it useful to cover the patient's face with steridrape so that any twitching of the facial muscles could be noted and always at hand was a nerve stimulator, which is invaluable in identifying the main trunk of the facial nerve or one of its branches.

The incision used is the standard one but it must be carried well up over the mastoid process and also a branch cut behind the ear; the external auditory meatus should be plugged with sterile wool and the lobe of the ear retracted by skin hooks by an assistant.

The skin flaps should be reflected forwards as far as the anterior edge of the gland where it rests on the masseter muscle.

The next step is to mobilise completely the posterior edge of the gland so that it is free from the sterno mastoid muscle and at this stage the cervical branch of the facial nerve can conveniently be isolated just behind the angle of the jaw (by the stimulator).

The posterior edge of the gland is next elevated and the posterior belly of the digastric muscle found and traced up towards the mastoid process. At the upper end of the incision the wound is carefully deepened in order to find the facial nerve which is usually easily seen and recognized by stimulation. Occasionally the nerve comes out of the foramen in its branches so that no trunk is visible—fortunately this abnormality is rare.

If the field is unusually bloodless the small twigs given off by the main trunk can be seen.

Once the nerve has been identified the superficial lobe can readily be removed and the entire nerve can then be displayed.

Great care should be taken in retracting the gland and the tumour as it is at that stage that rupture of the capsule may take place.

When the styloid mastoid process is hidden by the tumour the cervical branch may be found and traced upwards to make sure of the relation of the tumour to the nerve.

In other circumstances twigs of the nerve may be found and identified at the anterior edge of the gland and traced backwards; I used to do this as a routine measure, but I think identification of the main trunk is the best procedure.

If, as sometimes happens, the nerve passes over the tumour, then it may be necessary to sacrifice a few fibres of it in order to extract the adenoma.

Temporary weakness of the face is not unusual, but complete recovery

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is the rule. The patient should be warned before the operation that this complication might occur.

In none of our cases was total excision of the gland carried out and fortunately no patient developed a permanent facial palsy.

Next, we must discuss the indications for post-operative irradiation (Table I).

TABLE I.

INDICATIONS FOR POST-OPERATIVE IRRADIATION FOLLOWING EXCISION OF PLEOMORPHIC ADENOMA

1.	Recurrent tumour.
2.	Unusual cellular activity in the adenoma.
3.	Tumour adherent to the facial nerve.
4.	Tumour impinging on pharynx.

Recurrences not infrequently occur under the scar of a previous operation and therapy may help to reduce the incidence of further recurrences by suppressing any remaining tumour cells which have escaped excision.

Should the Pathologist report unusual cellular activity, therapy is generally given, since such tumours are liable to recur. If the tumour has been adherent to one of the main branches of the facial nerve, therapy is indicated, since one or more small satellites might have remained attached to the nerve.

The last group of giant tumours will be considered separately.

Simple tumours of the submandibular gland should always be treated by excision of the whole gland, particular care being taken to avoid injury to the cervical branch of the facial, as that produces an unsightly drooping of the lower lip on the affected side. If the platysma muscle is included in the flap, this complication may be avoided.

Any tumour of the submandibular gland should receive immediate surgery as, out of 22 such tumours seen at The London Hospital, eight were carcinomatous and none of the latter survived five years.

The percentage ratio of simple to malignant tumours is, therefore, quite different from that seen in the parotid gland.

A routine X-ray of the chest should be done in all cases before operation.

Giant tumours of the parotid are unusual; they were first described in detail by Patey and Thackray in 1957 (Patey and Thackray, 1957), who coined the name 'dumb-bell' for them, owing to their typical shape, consisting of a large, deep portion arising from the deep part of the gland, which encroaches on the lateral pharyngeal wall, and a smaller superficial part, which is joined to the deep extension by a tongue of tumour which passes between the angle of the jaw and the styloid process.

The anatomy of these peculiar tumours was again fully described by Patey and Ranger in another paper in the *British Journal of Surgery* (Patey and Ranger, 1957).

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In our series, we have met with three cases which will be described in detail, since they were removed via the pharynx.

Patey considers that these tumours can always be removed externally after fracturing the styloid process and dividing the stylo-mandibular ligament, but, to surgeons familiar with intra-oral work, the trans-pharyngeal approach might be acceptable.

These three intra-oral operations were conducted by Mr. Charles Keogh while I identified the facial nerve via an external incision.

Case 1

Man aged 53.

1950: Came to hospital with a large swelling in the neck and some dysphagia.

28 February 1950: Excision of a large tumour from the lower pole of the left parotid gland. Pathological report: an Adenoma.

1960: He was re-admitted with increasing dysphagia due to a huge pharyngeal swelling, which could be felt externally.

24 April 1960: The facial nerve was exposed from without. Mr. Keogh then exposed the tumour by a transverse incision through the superior constrictor muscle. The adenoma extended up as far as the foramen ovale and posteriorly was in close relation to the carotid sheath. The tumour was removed intact through the mouth and the muscle re-sutured. The size was 6·5 by 3·5 by 4 cm. A temporary tracheostomy was necessary.

The pathological report showed no sign of malignancy.

The man did well, but died from a primary carcinoma of the lung in 1962.

Case 2

Woman, aged 35.

29 March 1956: Was admitted with a swelling under the left jaw, which she had noticed for a year. There was an external parotid tumour and the left side of the palate was pushed inwards.

4 May 1956: Mr. Keogh and I first exposed the facial nerve and its branches; the main mass was then approached through the pharyngeal wall and was gradually removed, although, in places, it was adherent to the base of the skull. It extended down as far as the fifth cervical vertebra. The waist of the tumour was divided and the superficial and deep parts removed separately. A number of so-called satellite tumours were also taken away from the posterior pharyngeal wall and the base of the skull.

Her recovery was uneventful and a tracheostomy was not required.

Pathological report: Adenoma.

Post-operative radiotherapy was given and she remains well.

Case 3

Man, aged 45.

Eighteen months: Swelling behind the left jaw.

One week: Increased difficulty in breathing and an emergency tracheostomy was performed elsewhere.

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2 May 1958: Mr. Keogh and I first exposed the facial nerve and found that the tumour was deep to it.

The pharyngeal wall was opened and Mr. Keogh excised this large growth completely. The lateral part of the tumour arose from the deep part of the gland. Several satellite tumours were again found and removed.

Pathological report: Mixed salivary tumour.

The patient recovered well and had a full course of telecobalt, as the cells in the tumour were irregular and showed evidence of mitotic activity.

The man remains well.

I do not recommend the trans-pharyngeal approach to any surgeon who is unaccustomed to intra-oral surgery. Disastrous bleeding might well occur and efforts to stop this could inflict permanent damage to the facial nerve.

Results of treatment

In 1964 I reviewed the results of 373 tumours of the parotid gland in a paper presented to the International Society of Surgery in Rome (Butler, 1964). These patients had been treated between the years 1943–1958 and all had been followed up for five years or more.

Many of these patients had received their surgical treatment in regional hospitals, but all had attended the follow-up in the Radiotherapy Department at The London Hospital.

Table II shows that out of the 373 there were 300 simple tumours, whose site is shown in the next Table (Table III).

TABLE II.

Total number of cases	373
Mixed tumours	300
Salivary carcinomas	69
Adenolymphomas	4

TABLE III.

Mixed parotid	247
Submandibular	22
Other sites	31
	300

The treatment these 300 patients received is next shown (Table IV), and it will be noted that the great majority had combined surgery and some form of radiotherapy.

The late results are of considerable interest since most of these 300 patients were treated before the routine introduction of superficial parotidectomy. You will see that the results were excellent, showing, as they do, a recurrence rate of only 2·5 per cent (Table V).

In our view, these figures strongly support the argument for the use of post-operative therapy in patients who have not undergone superficial parotidectomy.

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TABLE IV.
TREATMENT

Surgery alone	58
Surgery plus radium	157
Surgery plus DXR	64
Surgery plus cobalt	10
No treatment	7
DXR only	4
	300

TABLE V.
RESULTS

Dead	19
Untraced	12
Residual tumour	7
No recurrence	262
	300

None of the recurrent cases in this series developed carcinoma, although perhaps they were lucky, since there is no doubt that cancer occasionally develops in patients with recurrent tumours.

I would next like to show you some other figures, which were produced by Mr. (now Professor) Hardcastle for the meeting of the Association of Surgeons held at The London Hospital, in 1964. These patients had all been treated at The London Hospital and include immediate and late results for carcinoma, in addition to the simple tumours. The distribution of these tumours can be seen in Table VI, and you will notice the increased number of adenolymphomas and the relatively high number of submandibular carcinomas, a point which has already been mentioned.

TABLE VI.
SALIVARY TUMOURS TREATED AT THE LONDON HOSPITAL, 1945–1964

Pleomorphic adenoma	148
Adenolymphoma	33
Carcinoma	22
Sarcoma	3
Submandibular adenoma	14
Submandibular carcinoma	8
	228

In the next table are the late results following excision of adenolymphomas; these figures confirm the impression that recurrence is most unusual (Table VII).

One hundred and forty-eight patients with pleomorphic adenomata were operated upon and 88 of these received radiotherapy. One hundred and five of these patients were traced for over five years and there was only one recurrence.

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TABLE VII.
ADENOLYMPHOMAS: TREATMENT

Surgery alone	26
Surgery plus radiotherapy	7
RESULTS	
No signs of recurrence (5 years or more)	14
No signs of recurrence (1–4 years)	14
Recurrence	0

Carcinomas of the salivary gland

Primary carcinoma of the submandibular gland is a rare but deadly disease. Only eight cases have been treated at The London Hospital; none survived for five years, death being due to early blood stream deposits in the lungs and elsewhere.

The only hope of a cure is by early surgery and every tumour of the submandibular gland should be operated upon as early as possible, since pre-operative diagnosis of malignancy is difficult unless the tumour has infiltrated the tissues of the submandibular triangle, by which time any treatment is to be regarded as palliative.

Carcinoma of the parotid is a commoner tumour (Table VIII) and presents generally as a primary growth; sometimes pre-operative involvement of the facial nerve brings the patient to hospital.

TABLE VIII.
MALIGNANT TUMOURS OF PAROTID 1945–1964

Carcinoma:	
Surgery alone	1
Surgery plus radiotherapy	19
Results:	
No sign of recurrence	7
Died	13
Cylindroma:	
Surgery plus radiotherapy	2
Free from recurrence (1 year and 5 years)	2
Lymphosarcoma	2
Ret. celled sarcoma	1
Survivals noted	1

In The London Hospital series, cylindromas carried the best prognosis, but over 50 per cent of the remainder died from recurrent tumour within five years.

Block dissection of the involved glands should be done if the glands are obviously involved, but the prognosis does not seem to be favourably affected by the extended operation, since here again spread occurs mainly via the blood stream to the lungs.

Finally, I would like to describe to you an unusual swelling in the parotid region in a girl of 11. Three weeks: Swelling of the left parotid, which was thought to be mumps. This was aspirated and pure blood obtained. The swelling rapidly returned.

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14 March 1967: I explored the swelling, which apparently arose in the deep part of the parotid gland. Part of the wall contained what seemed to be large venous sinuses, some of which were ligated. A small pack was left in the wound. She did well and the swelling did not recur.

19 April 1971: She again attended the hospital with a small recurrence of the swelling, which rapidly subsided without further treatment.

The possible diagnosis was that of a congenital venous malformation around the parotid.

Summary

I have tried to outline the diagnosis, treatment and prognosis of tumours of the salivary gland.

The operative technique of superficial parotidectomy has been outlined and the late results to be expected have been given. These are very similar to those achieved by simple excision combined with post-operative therapy.

Special mention has been made of the giant dumb-bell tumours of the parotid and the technique of trans-pharyngeal excision has been described.

Lastly, carcinoma of the salivary glands has been reviewed and the poor prognosis of submandibular carcinoma particularly stressed.

In conclusion, I should like to thank Dr. Walter Shanks for his help in preparing this lecture and Mr. Patey for kindly supplying me with reprints of his various articles on parotid surgery.

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The London Hospital,
Whitechapel,
London E.1.

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