

tissue does not normally occur (Davis *et al.*, 1955). This stipulation is necessary, since benign tumours have a multifocal origin in approximately 10% of cases, but in such cases tumour cells are confined to tissues which normally contain chromaffin elements. Case 1 was regarded as malignant because pheochromocytoma cells were found in a lymph node, a site which would not normally contain chromaffin elements. On the other hand, Scott and Eversole (1960) and Farley and Smith (1959) described cases where nodules of tissue completely composed of pheochromocytoma were found in relation to the iliac vessels, and since no lymphatic tissue was present both of these cases were regarded as being tumours of multifocal origin. Alternatively, it is possible that a lymph node had been involved and had been completely replaced. If this were so it would indicate a very good prognosis in this type of case, since both of these patients were alive and well six and seven years afterwards.

Another feature of Case 1 which may indicate a good prognosis is the fact that the principal metabolite found in the urine was normetadrenaline. Robinson *et al.* (1964) found that the precursor dopamine was present in large quantities in the urine of a patient suffering from a malignant pheochromocytoma and that this substance was again present in the urine when the growth recurred 11 months later. Dopamine is found at an early point on the metabolic chain leading to the production of adrenaline and noradrenaline, and it may be that its presence in the urine indicated a more primitive type of tumour and hence a bad prognosis. No trace of dopamine could be found in the urine of our patient either before or after operation.

Some 10% of pheochromocytomas are malignant, and in general the prognosis of these malignant tumours is poor (Hermann and Mornex, 1964). After initial surgical treatment there is usually a period of amelioration lasting for about a year, after which hypertension returns and soon causes death. Longer survivals have been recorded, and one of these was in a child (Cone and Pearson, 1963). In this case, six years after the removal of a tumour from the organ of Zuckerkindl, persisting hypertension led to a further exploration, when recurrent growth was found in the retroperitoneal tissues. For these reasons it was difficult to assess prognosis in our case, and in view of the doubt it was decided to give a course of radiation treatment. Radiation has previously been used in the treatment of malignant recurrences, but not at the time of the original treatment, probably because opportunities for doing this are few and far between. No ill effects have been noted to date, and a careful follow-up will be maintained.

Summary

Three new cases of pheochromocytoma of the bladder are reported, bringing the total of recorded cases to 20. An unusual feature of Case 1 was the presence of a tumour deposit in an iliac lymph node. In view of this finding a course of post-operative radiotherapy was given.

The most common symptom of vesical pheochromocytoma is a feeling of throbbing or pain in the head during or immediately after micturition. Haematuria occurs rather less frequently. Diagnosis is made by cystoscopy, biopsy, and estimation of urinary catecholamine excretion.

Partial cystectomy is the most satisfactory form of treatment, and the results in most cases have been good.

We wish to thank the many surgeons who have been so kind as to supply us with follow-up information on their patients. In particular we thank Dr. Stanley E. Farley and Mr. J. F. R. Withycombe, who have allowed us to describe previously unpublished cases. We would also like to thank Mr. Cyril Shaldon, who performed the tumour catecholamine assay, and Dr. John Wright, who carried out urinary chromatography studies. Case 1 was presented at a meeting of the Section of Urology at the Royal Society of Medicine.

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Nerve Injuries after Plating of Forearm Bones

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In spite of the increasing frequency of open reduction and plating of forearm bones, the number of reported neurological complications is small. In a large series of cases Burwell and Charnley (1964) reported only one case of posterior interosseous nerve palsy, following the Thomson posterior approach. Anterior interosseous nerve palsy in two cases of closed forearm bone fracture was reported by Warren (1963). The cause there may be damage from the fractured bone ends, from nerve stretch in the course of manipulation or at the time of injury, or from compression due to haematoma in the deep forearm space. Though the superficial radial nerve is often temporarily damaged during dissection or during retraction of the brachio-

radialis in the anterior Henry approach, other nerve lesions do not seem to be commonly described. Four motor-nerve injuries following plating of forearm bones are described. They were encountered over a period of several years, but no attempt is here made to indicate the frequency of such lesions in relation to a series of uncomplicated forearm operations. Involvement of the part of the anterior interosseous nerve supplying the flexor pollicis longus occurred in three patients and of the posterior interosseous nerve trunk in one.

Case Reports

Case 1 (Fig. 1).—Primary plating and grafting of radius and ulna was carried out three days after injury. The radial fracture

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was high and the ulnar fracture about mid-shaft. There was no neurological deficit before operation, but immediately after it anaesthesia was noted in the territory of the superficial radial nerve, and the flexor pollicis longus was found to be paralysed. Recovery in function of the flexor pollicis longus began after eight weeks, and later became complete.

Case 2 (Fig. 2).—Plating of both bones of forearm was performed two weeks after injury. The radial fracture was (as in Case 1) high. Immediately after operation there was sensory loss in the territory of the superficial radial nerve and complete paralysis of the flexor pollicis longus. There was normal power in all the profundus tendons. There was no neurological deficit before operation. Recovery was noted in the flexor pollicis longus at six weeks; at three months sensation was still slightly impaired, but the flexor pollicis longus had recovered full power.

Case 3.—Immediate plating of both forearm bones was carried out. Each fracture was approximately mid-shaft. An isolated paralysis of the flexor pollicis longus was noted post-operatively; after three and a half years this must be regarded as permanent.

Case 4 (Fig. 3).—Grafting and further plating was carried out four months after unsuccessful primary plating of a high radial fracture. A complete posterior interosseous nerve palsy was found immediately after operation. Full recovery had occurred three months later.

Discussion

Reliable conclusions cannot be drawn from Case 4 because the lesion occurred after surgery in a difficult and scarred operative field. It is worth noting, however, that this nerve is an anterior structure for an appreciable part of its course, and is therefore vulnerable in high radial fractures when the Henry approach is used. Stretch of the nerve could occur, for instance, as the result of heavy retraction on the upper part of the brachioradialis, since the segment of the nerve between origin and entry into the supinator canal is relatively immobile.

Careful stripping and lateral reflection of the supinator should help to avoid such damage, since the nerve will then be displaced laterally with the muscle.

Paralysis of the flexor pollicis longus, which affected three of the four patients, seems to be a more distinct operative hazard. The time taken for recovery was never less than six weeks. This implies that the paralysis is due to a lesion in continuity of the motor nerve involved, and is not the result of simple inhibition of the muscle following operative trauma. A post-mortem dissection showed the anterior interosseous nerve to run obliquely from medial to lateral from its origin to the usual point of innervation of the flexor pollicis longus; it then

changed direction to run distally, closely applied to interosseous membrane and radial shaft. It was shown that the segment of nerve between its origin and the major branches to thumb flexor was taut when the forearm was supinated. Relaxation could be obtained by pronating the forearm or by stripping the flexor pollicis longus from the radius so that it fell medially on to the interosseous membrane.

Heavy medial retraction, mainly of sublimis and underlying median nerve, will stretch this segment readily, and the fibres destined to innervate the flexor pollicis longus will be specifically affected. Branches of the nerve to the flexor digitorum profundus will not be affected, since they arise more proximally and medially, lying under cover of the retractor and running in the direction of the pull (Fig. 4). The point of entry of the nerves to the flexor pollicis longus varies (Brash, 1955), but in 73% of dissections it was found in the proximal third of the muscle. It is worth noting, however, that the coronoid head of the muscle, when present, receives a separate nerve supply from the medial border of the nerve, and this, in the same way as branches to the flexor digitorum profundus, will not be subject to traction. Such a variation will ensure some residual function in the flexor pollicis longus after the type of injury described but will apply only in a small proportion of cases—

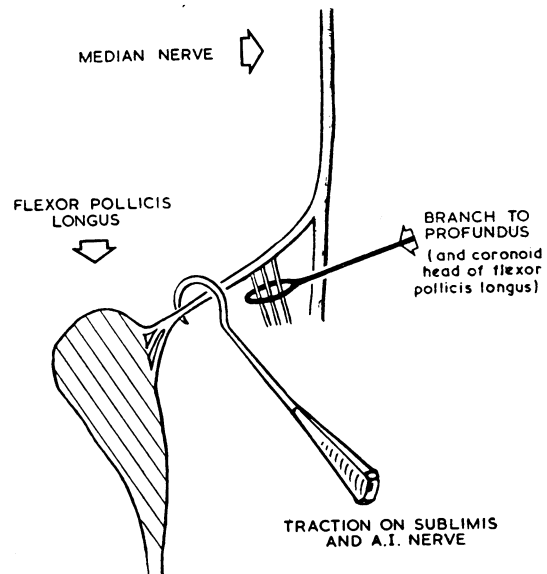


FIG. 4.—Diagram illustrating possible mechanism of injury to antero-interosseous nerve.



FIG. 1.—Case 1 after plating.

FIG. 2.—Case 2 after plating.

FIG. 3.—Case 4 after plating.

five dissections out of 30 (Brash, 1955). It is of interest to note that high radial fractures occurred in two of the three cases described. Reduction of such fractures is easier in supination, and stripping of the flexor pollicis longus is less necessary for exposure. Thus conditions are eminently favourable for a traction injury of the nerve. In Case 3 the radial fracture was not high and the paralysis has been permanent. In this case the cause may be different.

The cases in this series differ from those with closed forearm fractures described by Warren (1963), in which the flexor digitorum profundus to index was paralysed in addition to the long thumb flexor. This indicates that the nerve trunk was involved, since the anterior interosseous nerve constantly supplies the index segment of the profundus muscle (Seddon, 1954). The pronator quadratus will be paralysed in both types of injury, but there are no clinical means of detecting this.

Summary

Four cases of nerve lesions after plating of forearm bones are described. The probable cause of such lesions is discussed. The prognosis generally seems to be fairly good and recovery can be expected in most cases.

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Acute Non-specific Pericarditis. A Description of Nineteen Cases

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Acute non-specific pericarditis has been a recognized condition for many years. The first case was described by Hodges in 1854. It was not, however, until 1942 that Barnes and Burchell reported 14 cases of acute non-specific pericarditis simulating myocardial infarction. Since then numerous cases have been reported, mostly in the American literature, but only one large series (14 cases) has been described in the British literature (Swan, 1960). The present paper reports 19 cases that have been seen in one peripheral general hospital of 550 beds—most of them within one year.

The clinical picture of acute non-specific pericarditis is familiar and classically presents with the sudden onset of dull aching retrosternal pain, which may be severe and often follows a recent infection of the upper respiratory tract. The pain may radiate to the shoulders, neck, back, or down the arms. It is often made worse by deep breathing or from lying on the back or left side. A pericardial friction rub may be heard, and the E.C.G. shows elevation of the S-T segments over a varying number of leads. There is usually a polymorph leucocytosis. The illness is characteristically benign and the patient usually improves symptomatically within a week or 10 days and is completely well in six to eight weeks. In a few days the cardiographic appearances alter; the S-T segments return towards the iso-electric line, and after a week the T-waves become inverted. There is no reciprocal depression of the S-T segments, and the QRS complexes are not disturbed unless there is a pericardial effusion. The T-waves revert to normal at any time between a few days and several weeks.

Clinical Features

The following Table gives the clinical features, age incidence, and sex ratio of the cases in the series.

Premonitory Chest Pain.—This occurred in six patients—in four cases one week, in one case three weeks, and in another case four weeks before their admission to hospital. These attacks of pain were identical in character and distribution with the attacks which necessitated their admission to hospital, but less severe and of shorter duration, usually four to six

hours. After these brief attacks all the patients were quite well, and in only one was there a history of upper respiratory infection.

		Clinical Features in 19 Cases	
Age incidence	...	...	22 to 61 years
Average age	...	...	39.4 years
Ratio males to females	...	...	8.5:1
Preceding upper respiratory infection	...	...	5 cases
Premonitory chest pain	...	...	6 "
Presenting chest pain	...	...	19 "
Radiation of pain to shoulders, neck, and arms	...	...	14 "
Pain made worse on respiration or position change	...	...	13 "
Peripheral circulatory failure	...	...	4 "
Pericardial friction rub	...	...	12 "
Pericardial effusion	...	...	4 "
Pleural effusion or pneumonitis	...	...	4 "
E.C.G. {	S-T segment elevation	...	17 "
	T-wave inversion during illness	...	4 "
	Most leads	...	5 "
E.C.G. {	aVL only	...	6 "
	Flat T waves	...	13 "
Raised E.S.R.	...	...	9 "
White count raised above 10,000/c.mm.	...	...	1 case
Neutropenia	...	...	3 cases
Recurrences	...	...	...

Presenting Chest Pain.—All patients in this series presented with pain in the chest. This was generally fairly severe and persisted for two to three days; it was their major complaint. In four cases it was extremely severe, these patients being in a shocked state on admission—pale, sweating, and with marked hypotension; in three a myocardial infarction was initially suspected, and one was treated with anticoagulants for 24 hours. Chest pain in all cases was retrosternal, and dull and aching in character. In 14 cases the pain radiated to either one or other shoulder, to both in some, and in one case down the arms. In three patients the pain radiated up into the neck; in 13 it was markedly worsened by deep breathing and in five by lying on the left side.

Pericardial Friction Rub.—A pericardial rub was heard at some stage of the illness in 12 cases. In all but one it was heard on admission. It was typically loud and widespread over the praecordium, and was noted to disappear for varying intervals. In one case the pericardial rub persisted for 16 days and in another for seven days. In the other 10 cases the rub lasted for two to four days. No correlation was noted between the duration and severity of the illness and the presence or duration of the pericardial rub.

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