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The Surgical Approach to Lymphadenopathies*

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The diagnosis of the true nature of a lymph gland enlargement must finally rest upon histological evidence. With the increasing use of radiotherapy it often happens that patients are treated without a definite diagnosis being established, because of the major operation entailed in obtaining histological evidence. Yet the clinical and radiological findings on which the diagnosis must otherwise rest may be misleading and the treatment given may, as a consequence, be unsuitable. Moreover, unless the clinical diagnosis is supported in all cases by histological evidence, some doubt as to the correctness of the diagnosis cannot altogether be discounted when the value of treatment comes to be assessed later, particularly five-year cures by radiotherapy.

The time-honoured methods of surgical diagnosis in lymphadenopathy are, firstly, aspiration or needle biopsy; and secondly, lymph gland resection.

Aspiration of material for microscopic examination in specific instances is an old procedure, but the elaboration of its use in the rapid diagnosis in malignant neoplasm is due principally to Martin and Ellis in 1930 and 1934, and others.

In brief, the advantages are clear. Firstly, the operation is comparatively simple and can be done on out-patients. Secondly, it is not, from the patient's point of view, a very expensive or terrifying procedure. Robb-Smith (1938) states that the indications for its use are wide and few lesions need remain without a diagnosis, and that injury to normal tissues surrounding the lesion is minimal. After removal of the needle the puncture is quickly sealed by retraction of the tissues. Martin and Stewart in 1936 observed no untoward symptoms or sequelae in 3,500 aspiration cases done through a wide variety of tissues.

The disadvantages outweigh the advantages. It is generally accepted with Ewing (1913-14) that a surgical biopsy, through normal tissue, is fraught with danger because such a procedure

is liable to break down local barriers to spread of infection and, in the case of a neoplasm, to favour early metastases, local carcinomatosis or fungation of the growth through skin.

The operation is simple, so much so that the practitioner carrying out the procedure may not register the fact that inability to obtain positive evidence of pathology does not rule out the presence of a diagnosable lesion. Finally, the piece of tissue obtained is small and its structure may have been distorted and prove a strain on the patience of the pathologist. It is of use, however, in cases where surgical biopsy could not be obtained without a major surgical operation, particularly when such a major operation would be unlikely to allow of the successful removal of the tumour.

The second method of surgical diagnosis lymph gland removal, is regarded as the method of choice. The gland must, in all cases, be removed with its capsule intact. This is of importance from the pathologist's point of view and also in the prevention of local spread. As regards the selection of a technique in removal of the gland, there are important factors to remember. Where there is only a single enlarged node, or enlarged nodes are limited to one site, the problem of selection does not arise, but where there is widespread lymphadenopathy it is unfortunate that those nodes which are most readily accessible to the surgeon's knife are least suitable for histological diagnosis. Inguinal nodes are commonly scarred and cervical nodes may show reactive hyperplasia, and these non-specific changes may obscure more significant histology. The nodes of election for histological diagnosis are in the axilla or low cervical region. Nodes not markedly enlarged may show gross histological changes and diagnosis of a continued pyrexia may be determined by biopsy of an insignificant gland. When the site has been determined the surgeon should remember several points. To be a satisfactory biopsy the whole gland should be removed, with its capsule intact. Preferably several glands should be removed, and the temptation to incise such glands after removal should be resisted.

Adequate exposure, as in all surgery, should be obtained, as distortion of the node or nodes removed must be avoided. Finally, it is as well to remember that an enlarged lymph gland is not as superficial as it feels, and in all cases general anaesthesia is advised.

The gross anatomy of the lymphatic system is common knowledge and it should therefore suffice to point out the salient features only.

* Address delivered at the Annual Congress of the Medical Council of S. Rhodesia at Que Que on 20th September, 1958.

Since enlargement is the common factor in all diseases of the lymphatic glands, the normal position of these structures is important.

In the cervical region the position of the pre-auricular and post-auricular, submental and occipital groups of superficial glands should be noted, together with the inconstant facial gland.

The deep cervical glands are divided into upper and lower groups by the omohyoid muscle and into medial and lateral groups by the internal jugular vein.

The fact that the epitrochlear and popliteal glands are the most distal in the respective limbs should be stressed (Edwards, 1936).

That a swelling is, in fact, of glandular origin depends upon noting that it occurs in a known anatomical position of a lymph gland. One cannot overstress the necessity for examination of the whole patient with any glandular enlargement.

In acute lymphadenitis surgery has no place unless an abscess forms. Incision then becomes imperative. The timing of the incision will be planned to allow for localisation of the pus and its site should be in a skin crease over the area of fluctuation. Bacteriological examination of the pus is essential, for upon it the choice of antibiotic will depend.

TUBERCULOSIS

Both human and bovine bacilli usually enter the body via mucous membranes. Often the bacilla gain access to lymphatics and regional glands become enlarged, and it is the glandular condition which excites attention. Caseation may follow, and when the tuberculous pus breaks through the capsule a cold abscess is formed which may necessitate surgery. Tuberculosis of the glands in the neck is commonest in childhood, but adults and the aged are not immune. The disease, however, is becoming rare. Forty years ago excision of the glands of the neck had the honour of being one of the commonest major operations performed at any children's hospital.

One may perhaps be permitted two generalisations in relation to surgery of tuberculous glands. Firstly, that resort to excision ought not to be delayed unduly in the adult in whom the condition is usually of a more chronic yet resistant type. Secondly, that radical surgery should be withheld from infants and children during the more acute stages of the infection, when periadenitis is a marked feature. Anti-tuberculosis measures should be undertaken and

surgery limited to opening and evacuating abscesses as they occur, when "pointing."

Curetting of such abscesses is harmful, but good results have been reported from local instillations into the cavity of para-aminosalicylic acid (Morris and Prosser-Evans, 1951). The sinus resulting from bursting of an abscess will usually be found to lead to the undestroyed remnant of the affected gland lying deep to the fascia. When circumstances are propitious it should be excised, together with the gland. The results of careful surgery of this nature are uniformly good.

Tonsillectomy, or removal of tonsillar remnants, should precede any radical surgery in children, except when the glands are softening but not yet burst, where it may be expedient to remove the glands first. Streptomycin is best used as an "umbrella" in radical surgery and not primarily in the treatment of localised tuberculous glands.

Surgery undoubtedly has a place in the treatment of Hodgkins' disease. It has been observed on many occasions that complete extirpation of the affected glands is often followed by prolonged remission of the disease. Many believe that the disease is initially a local process and that, if removal of all diseased tissue were practicable at this stage, cure would be possible. Since the primary site is often visceral, conditions are seldom favourable, but those patients in whom the cervical nodes on one side are affected, particularly when the disease is limited to the upper groups, and in whom clinical and radiological examination reveals no other lesion, are offered their best chance of cure by block dissection of the affected groups of glands, followed by heavy irradiation.

The services of the surgeon are, of course, required for biopsy and occasionally for splenectomy when "hypersplenism" threatens life.

Irradiation is undoubtedly the best method of treating the new formations in Hodgkins' disease; under its influence large nodes shrink, and with their disappearance the general symptoms abate.

There is, however, no general agreement on the best method of applying radiotherapy. Undoubtedly each patient requires individual consideration, and a stereotyped therapeutic regime is strongly to be deprecated.

The most generally used technique is to irradiate each area of disease sufficiently widely to include all pathological tissue. Full dosage is best employed if only one group of lymph

nodes is affected, but lesser doses are probably advisable if several fields require irradiation. When there are diffuse lesions within the abdomen, "bath" technique may be used. Massive mediastinal tumours require particularly careful treatment; they are often extremely sensitive, but treatment is sometimes followed by a serious aggravation of local and general symptoms.

Careful follow-up of patients is a prerequisite and further irradiation should be given whenever fresh lesions make their appearance.

It is inevitable, from the surgeon's point of view, when one thinks of enlarged glands, one thinks of neoplasm. One of the most prominent features of the behaviour of carcinomas is their frequent production of secondary growths in regional lymph nodes. Most of these growths undoubtedly arise initially from detached tumour emboli carried to the glands in lymph flow and not by continuous permeation from the primary growth to the glands.

The spread from gland to gland is via tumour emboli until a fairly late stage, when glands become bound together by tumour-occluded lymphatics and infiltrated extra-capsular tissues. When an entire gland is replaced by tumour tissue, further spread is often wide—via collateral lymphatics retrograde flow and even direct spread to adjacent veins.

It must be remembered that in many instances secondary lymphatic growths have been mistaken for primary lesions. Large secondary growths in the cervical lymph glands may be the first clinically evident result of an otherwise symptomless primary carcinoma of the tonsil, base of tongue, pharynx, oesophagus or lung or, as a precocious Troisier sign, of even a gastric or other abdominal carcinoma.

Lundsgaard reports a case in which large cervical growths were the first sign of a small symptomless carcinoma of the prostate. Willis (1934) describes a specimen he examined consisting of a mass of growth six centimetres in diameter in the axillary glands, excised as a probable Hodgkins' disease. Microscopically this showed the typical structure of an acinar prostatic adeno-carcinoma. Rectal examination then revealed a hard nodular enlargement of the prostate.

Surgery is the treatment of choice for lymph gland metastases of squamous cell carcinoma, which, unlike the primary lesions, usually responds poorly to radiotherapy. The most satisfactory procedure is the block dissection of the cervical lymph glands.

By block dissection of the neck is meant the removal of the sheath of deep cervical fascia from the horizontal ramus of the mandible to the clavicle and from the midline anteriorly to the anterior border of the trapezius posteriorly. Such excision carries with it the various groups of lymph glands in the submaxillary and anterior triangles of the neck. For a complete excision of the lymph glands it is necessary to remove the sternomastoid muscle, the internal jugular vein and the omohyoid and digastric muscles.

The operation is indicated when there is a reasonable prospect of permanent control of the disease and the cervical glands must be enlarged and clinically involved. The glands must be not only removable, but strictly operable. Finally, the general health of the patient must permit of a major operation.

The contra-indications must be emphasised. The absence of enlarged glands; the so-called "prophylactic" block dissection is not a justifiable procedure. Old age and poor health increase the operative risks considerably. Fixation of the lymph glands, however slight, to the vascular sheath or the pretracheal fascia precludes a complete removal of the malignant tissue and rapid recurrence is the rule.

Bilateral block dissection is indicated when clinically malignant but operable glands are present on both sides of the neck. For example, from lesions in the central part of the tongue, or floor of the mouth, which respond well to treatment. An interval of three, and preferably six, weeks should elapse between the two operations, otherwise the venous return from the brain is impaired by the removal of the remaining internal jugular vein, and cerebro-vascular disturbances follow the operation. The prognosis is grave and the operation is seldom justified, and in cases of primary growth of the uvula, nasopharynx and soft palate, X-ray therapy is the treatment of choice.

The operation will not be discussed in detail; suffice to say that position of the patient is important. A small sandbag is placed under the shoulder, the head is rotated to the opposite side and slightly extended, but not too much, as otherwise the cervical veins become distended with blood.

The incision as described and practised by Sir Thomas Dunhill is the one advocated. A curved incision is made; it begins behind the mastoid process, at the posterior edge of the uppermost part of the sternomastoid muscle, and extends at first downwards, then forwards to the level of the upper border of the thyroid

cartilage, thence upwards to the mandible beyond the midline anteriorly. The second incision starts at the junction of the descending and horizontal portion of the first incision and extends downwards and backwards to the clavicle at the posterior edge of the sternomastoid muscle. These three flaps, by reflection, expose fully the posterior, submaxillary and anterior triangles of the neck. What is more, it leaves a supple and excellent scar.

In inoperable cases radium implants may be suitable for relatively small areas and may be made in one or more planes, according to the mass to be treated. Long needles—six centimetres is a convenient length—promote accuracy in implantation. The dosage should not greatly exceed 6,000 roentgen.

Surface applications of sorbo rubber are easily made and fitted. The radium is arranged two, three or four centimetres from the skin and uniformity of the dosage obtained is excellent, but a large amount of radium is needed and the treatment is prolonged. X-ray therapy is mainly of use in cases of adenocarcinoma.

Neoplastic involvement of the axillary glands most commonly occurs in carcinoma of the breast. The larger lymphatics from the breast run to the regional lymphatics. It is enough to say that the main line of drainage is laterally to the axilla, the pectoral and subscapular groups of glands being the chief recipients. Furthermore, from the upper part of the breast lymphatics may pass directly over the clavicle to the supraclavicular glands. Medially some lymph channels pass across the midline to join the lymphatic plexus of the opposite breast.

The axillary lymph glands are the most important surgically and are arranged as follows: The pectoral group, lying under the edge of the pectoralis major muscle, along the line of the lateral thoracic vessels. A subscapular group lying along the subscapular vessels on the subscapularis muscle. A lateral group lying along the axillary vein. An apical group at the apex of the axilla, behind the costocoracoid membrane, lying in relation to the first intercostal space and the upper part of the axillary vein. They receive efferent from the three previous groups and also from the infraclavicular glands in the superficial infraclavicular triangle.

From all these lymph glands the efferent vessels pass to the supraclavicular group of glands.

To clear the axilla the incision can be carried one inch medial to and above the anterior axillary fold and terminates over the insertion

of the pectoralis major muscle, or it can be carried backwards across the axilla from anterior to posterior walls. The skin flaps are raised with a quarter to half an inch of subcutaneous tissue. The removal of the axillary contents begins at the apex and gauze dissection is mainly used. The axillary vein is cleared. The subscapular vessels and nerves are stripped, but preserved. The intercostobrachial nerve is sacrificed, whilst the nerve to the serratus anterior muscle is preserved. The dissection should be continued downward until the lower border of the latissimus dorsi is reached. The operation site is always drained. This operation as part of a radical mastectomy may or may not be followed by X-ray therapy.

McWhirter (1948), of Edinburgh, has produced convincing figures advocating therapy alone to axillary glands. Keynes, in 1928, strongly advocated treating the axilla with radium implantation. He strongly advised against dissection of the axilla.

In treating axillary glands with radiotherapy it must be remembered that a low standard of radiotherapy will give uniformly poor results.

If following operative procedures, various points must be noted. Iodine should not be used in the pre-operative preparation of the skin, for this lowers the tolerance of the skin to radiotherapy. Tension on skin flaps and also skin grafting should be avoided for similar reasons.

Extremely stout patients prove difficult in order to deliver an adequate dose to the axilla, and operative clearance is preferred in these cases.

Supraclavicular glands are easy to irradiate and should never be removed surgically.

In actual treatment only one full course of X-ray therapy should be given. The common practice of repeated courses of treatment at intervals of three to six months is to be condemned and is as illogical as partial surgical removal of a tumour at similar intervals.

In the treatment of axillary and supraclavicular glands it is assumed that these apparently separate groups are, in fact, one continuous chain of glands. In order to irradiate effectively this chain of potentially involved glands, two opposed fields—one anterior and one posterior—must be used.

A field directed in from the base of the axilla is quite ineffective, for the "fall off" in dosage results in inadequate irradiation of the apex of the axilla.

A similar technique is used in tangential fields for chest wall, and every field is treated daily over a period of three weeks, and the minimal tumour dose delivered is 3,750 roentgen.

A penetrating beam must be used to pass through bone. The beam usually used is generated by a 250 kilovolt apparatus and is heavily filtered. A triple thorax filter is used for the shoulder fields. Lower powered apparatus is unsuitable, and when only this type of apparatus is available a radical operation should be performed (McWhirter, 1948).

Melanomas are unfortunately all too common in this country. Adequate and early treatment might prevent some of the tragedies that one sees so frequently.

Removal of the primary tumour should be followed by excision of the related lymph glands, even though these are not clinically involved.

Microscopic evidence of dissemination has been found in 50 per cent. of such glands in some series. It is doubtful whether a delay of three to six weeks after excision of the primary, in order to allow intervening melanoma cells to migrate to the lymph nodes, is of value. In certain cases it is not possible to predict the general direction of lymph flow, for example, in a melanoma overlying the spines of the upper lumbar vertebrae. In such cases it is justifiable to keep the patient under observation and perform a block dissection of the enlarged glands of groin or axilla, should these appear.

The prognosis is poor if the glands are enlarged when the patient is first seen, and in such cases involving the limbs, a forequarter or hindquarter amputation is likely to be the most efficacious form of treatment.

Dissemination of tumour cells in malignant melanoma, which can be curiously erratic, usually takes place first to the regional lymph glands, later via the blood stream. Again, the only certain method of diagnosis is by histological examination.

Indications for surgical intervention. There is much difference of opinion on this point, which is discussed by Tod (1944). For example, the patient may ask for the cosmetic removal of a pigmented mole, a benign melanoma which has been present for a long time and shows no sign of malignancy. Some surgeons strongly advise against this, but all agree that if the patient insists the tumour should be removed radically. Other authors advocate the prophylactic removal of pigmented cutaneous

tumours, especially in sites subject to trauma or irritation (Affleck, 1936).

By contrast, the patient may seek advice because a pigmented lesion has begun to grow spontaneously after injury or after injudicious treatment. In these cases surgical treatment must be radical. The fear that repair may present difficulties must not influence the surgeon in planning his incision (Tod, 1944). Whenever the regional lymph glands are enlarged the primary tumour and glands must be widely excised, preferably with block dissection of the intervening lymphatics.

When multiple metastases are present, palliative radiotherapy is usually advised, although these tumours are known to be radio-resistant. The successful treatment of pigmented basal cell carcinoma by radiotherapy accounts for some of the cures claimed.

If the presence of melanomatous metastases is confirmed during the dissection of the inguinal glands, then tissue removal should be extended to include the iliac glands.

To perform adequate excision of tissue in continuity is difficult with preservation of the inguinal ligament. A procedure whereby the anterior superior iliac spine is detached, the abdominal musculature incised vertically from the spine and the mass swung medially has been advocated. Division of the inguinal ligament and the underlying femoral sheath, however, allows a thorough removal of perivascular tissues and has not been found hazardous from the viewpoint of post-operative weakness.

Lymphorrhoea following lymphatic gland resection may be troublesome in the axilla and more so in the groin, where healing is often further delayed by necrosis of the skin edges and by mild infection.

A method of inguinal closure advocated by Lee (1955), whereby a crescentic abdominal flap is rotated downwards to replace the defective tissues in the wound, has given good results.

In conclusion, let it be said that no lymphadenopathy, in the absence of obvious causes, should be treated lightly.

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