GLOMUS TUMOUR OF THE KNEE

Report of a Case

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A glomus consists of arteriovenous anastomoses which may be enclosed by a connective tissue capsule. They are described occurring in the skin and subcutaneous tissue on the flexor surfaces of the fingers and toes and in the nail beds; but they also occur elsewhere in the corium (Liebow 1963). They are small pinkish-white nodules, which are benign and consist microscopically of small vessels lined by a single layer of normal endothelial cells and surrounded by one or several layers of "epitheloid" glomus cells. The proportion of vessel lumina to glomus cells varies (Landing and Farber 1956). Some regard the glomus tumour as a hamartoma (King 1954), but Stout (1956) regarded it as a benign tumour of pericytes.

Glomus tumours are distinguished clinically by their small size and the severity of the pain which they produce. They are uncommon and were found to represent only 1.6 per cent of 500 consecutive primary soft-tissue tumours of the extremities examined at the Mayo Clinic over a period of two and a half years (Soule, Ghormley and Bulbulian 1955). The anatomical distribution of seventy-four glomus tumours according to sex was reported by Shugart, Soule and Johnson (1963). Their findings confirmed other reports that in women the lesion was most common in the upper extremity and that it usually occurred under the nails. In men the lesions occurred less commonly in the extremities. In all patients pain was a constant feature and in sixty-five of the seventy-four it was paroxysmal.

This paper reports a glomus tumour occurring in the subcutaneous tissue of the knee of a woman. Despite extreme pain, there was delay in diagnosis but complete recovery followed excision of the tumour.

CASE REPORT

A woman of sixty-nine was referred to the rheumatology clinic of the Dunedin Hospital in 1962 with a thirteen-year history of pain in the left knee. The pain was continuous and severe, with episodes of severe pain lasting for about half an hour at a time, particularly in the mornings. A bluish-red swelling three centimetres by two centimetres developed over the front of the left patella after seven years of symptoms. The tumour was exquisitely tender and she held her clothes away from it as she walked. When it was incised by her doctor profuse bleeding occurred. No change in size had occurred over five years and there was no history of injury to the knee.

In 1951 she had attended an orthopaedic clinic complaining of increasing pain in the left knee for two years. Examination revealed hyperaesthesia of the skin over the patella but no other abnormality. Radiographs showed minimal degenerative joint disease. A diagnosis of infrapatellar panniculitis was made. Treatment with short-wave diathermy improved movement but not pain. In 1956 she was referred by another doctor with the same symptoms. She wept during most of the interview and held the knee stiff. A small tumour was seen which was thought to be a varicosity, but the hypersensitivity over it was so great that it could not be examined. A further course of short-wave diathermy failed to relieve the pain.

When seen in the rheumatology clinic the patient was tense, anxious and easily moved to tears, especially if the tumour over the left knee was touched. On at least two occasions she refused to allow the tumour to be examined. A warm, purplish swelling three centimetres in diameter was situated over the medial and lower border of the left patella. As it was so

tender it was not possible to determine if the tumour was attached to the bone, or to define the edge of it. The knee could not be flexed beyond a right angle and there was wasting of the thigh. The inguinal glands were not enlarged. Heberden's and Bouchard's nodes were present. Radiographs of the left knee revealed increased radiotranslucency of all the bones of the joint with slight loss of joint space.

A diagnosis of degenerative joint disease and a provisional diagnosis of a neurovascular tumour, probably a glomus tumour, was made. The patient refused operation and a further

FIG. 1

Showing the cut surface of the tumour and the enclosing capsule (enlarged).

FIG. 2

The microscopic appearance showing clumps of glomus cells in relation to vascular spaces. (Haematoxylin and eosin, $\times 187$.)

course of short-wave diathermy and exercises improved the range of knee movement. After six months, however, she agreed to excision and a solid, well encapsulated tumour 3.6 centimetres in diameter was excised (Fig. 1). Microscopic examination showed clumps of glomus cells of varying size, which were uniform and intimately connected with the numerous vascular structures (Fig. 2). The stroma was of fine fibrous tissue and the lesion well circumscribed with a condensation of fibrous tissue about its periphery.

After operation recovery was uneventful and when she was seen two years later there was no evidence of recurrence. Anxiety and pain had disappeared, movement of the joint was full and there was no wasting. Radiographs still showed coarse trabeculation and some demineralisation of the bone ends.

DISCUSSION

Pain from a glomus tumour can be so severe that a patient may demand amputation of a limb or even contemplate suicide. Shugart *et al.* (1963), who had seventy-four cases, commented that "almost surely diagnostic was the fact that some of the patients were reluctant, and often refused to allow palpation of the lesion during examination." Our patient was reluctant to be examined but did not have radiation of the pain, nor were there trigger areas, nor had there been previous injury at the site of the lesion.

When the tumour does not appear for several months or years after the pain has begun the diagnosis of a functional disorder is often made. King (1954) drew attention to the difficulty of diagnosis under these circumstances and cited four of twenty-eight cases in which neurosis was diagnosed when severe pain occurred before a tumour developed. In only forty-three of the seventy-four patients in the Mayo Clinic series was a tumour demonstrable on examination. In our case it was seven years before the tumour developed. Had the pain been at a more usual site for a glomus tumour exploration would probably have been made sooner.

Although bony erosions have been seen, particularly in association with subungual tumours, none was demonstrable in this case and only general thinning of bone, presumably due to disuse, was seen.

Shugart, Soule and Johnson (1963) reported ten cases of glomus tumour of the knee, all situated in the corium and subcutaneous tissues. Nine of the ten were in men. King (1954) reported a painless one in the knee of a man, and although the tumour was large by usual standards its pathological appearance was otherwise characteristic of a glomus tumour. Hoffmann and Ghormley (1941) reported one in a man occurring in the synovial membrane of the knee.

Shugart, Soule and Johnson included in their differential diagnosis of painful small tumours of the trunk and extremities glomus tumour, vascular myoma, haemangioma, sclerosing neuroma, "amputation neuroma" and nodular hidradenoma. They stressed the importance of microscopy to classify the tumour accurately.

The nature of the glomus tumour, whether hamartoma or benign tumour of pericytes, is still uncertain. There is a discrepancy between the limited distribution of normal glomera and the more widespread distribution of glomus tumours.

As a group, glomus tumours were separated from the "painful subcutaneous tubercles" which Wood (1812) described, by Masson (1924), who suggested that they represented a proliferation of the normal neuromyoarterial glomus. Murray and Stout (1942) concluded from tissue culture studies that the characteristic cell of the glomus tumour was a pericyte. This cell, described by Zimmermann (1923), is found closely investing capillaries. It is contractile and may represent modified smooth muscle elements such as are found in the walls of blood vessels. The pericyte is widely distributed and Stout (1956) suggested that this is why glomus tumours can arise in many tissues.

Stout (1956) stated that the glomus tumour is highly differentiated, has a definite architecture and is limited in distribution to the superficial soft tissues, the terminal phalanges of the hand and to the stomach. However, other authors describe tumours with the typical histological appearances in many sites including muscle (King 1954, Shugart *et al.* 1963) and synovium (Hoffmann and Ghormley 1941).

The reason for the severe pain that patients suffer is unknown. In some patients the tumour becomes blue during an attack of pain. Changes in vascularity may distort the capsule

and affect sensory nerves but in our case and in some other reported cases there was no clinical evidence of change in vascularity of the tumour during severe bouts of pain.

Cauna (1961) described the intimate relationship of Paccinian corpuscles to the normal glomus. Abundant neurofibrils have been reported in relationship to the glomus cells of glomus tumours (Lever 1949, Evans 1956), but others have not confirmed this (Gold 1950). Shugart *et al.* (1963) examined sixty tumours for neural elements and found nerves of varying size in the capsule or extracapsular tissue in fifty-three. In only one instance, however, was a small nerve trunk seen to send a few neurofibrils among a group of glomus cells and none terminated on glomus cells. Examination of sections from our case, with silver staining (Bodian), showed no neural elements either in relation to the glomus cells or within the capsule.

The complete recovery after the removal of an encapsulated tumour is the rule, and this happened in our patient without persistent hypersensitivity around the excision site which Love (1944) has reported.

SUMMARY

1. A case of glomus tumour of the subcutaneous tissues of the knee which presented with extreme pain is described. Successful removal of the tumour led to complete relief of pain and return to normal function.
2. The histological features are given.
3. The literature is briefly reviewed.

We are indebted to Professor J. Ludbrook for excising the tumour, to members of the Pathology Department for helpful discussion and to the Photographic Unit of the Otago University Medical School. We are grateful to Professor F. H. Smirk and Mr A. J. Alldred for comments during the writing of this report. One of us (D. E. C.) is in receipt of the Emily Johnston research scholarship and the New Zealand Medical Research Council pays the salary of T. C. Highton. These laboratories were in receipt of a generous grant from the Arthritis and Rheumatism Council for Research and from the Golden Kiwi State Lottery Fund.

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