GANGLIA OF THE FLEXOR TENDON SHEATHS IN THE HAND

PHILLIP MATTHEWS, CARDIFF, WALES

Simple ganglia are the commonest lumps occurring in the hand and they comprise about two-thirds of all hand tumours (Stack 1964). They may arise from various sites, one of the less common being the fibrous flexor tendon sheaths of the digits. Often honoured by the descriptive names “sesamoid” or “pearl-seed” ganglia, and possessing characteristics which distinguish them from their larger brethren elsewhere, the flexor sheath ganglia have not hitherto been studied separately although small numbers have been included in several large general series of ganglia (Carp and Stout 1928, Woodburne 1947, McEvedy 1962, Hvid-Hansen 1970).

This paper describes the features of these ganglia as they presented in a series of forty patients treated by the author at the United Cardiff Hospitals between 1968 and 1972.

TABLE 1

FIGURES FOR THE INCIDENCE OF GANGLIA OF THE FLEXOR TENDON SHEATHS IN THE HAND

<table>
<thead>
<tr>
<th>Authors</th>
<th>Date</th>
<th>Number of cases</th>
<th>Percentage</th>
<th>Authors</th>
<th>Date</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flexor tendon sheath</td>
<td></td>
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<td>Flexor tendon sheath</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carp and Stout</td>
<td>1928</td>
<td>255</td>
<td>13</td>
<td>5</td>
<td>Carp and Stout</td>
<td>1928</td>
<td>255</td>
</tr>
<tr>
<td>DeOrsay, Mecray and Ferguson</td>
<td>1937</td>
<td>50</td>
<td>8</td>
<td>16</td>
<td>DeOrsay, Mecray and Ferguson</td>
<td>1937</td>
<td>50</td>
</tr>
<tr>
<td>Woodburne</td>
<td>1947</td>
<td>58</td>
<td>4</td>
<td>7</td>
<td>Woodburne</td>
<td>1947</td>
<td>58</td>
</tr>
<tr>
<td>McEvedy</td>
<td>1962</td>
<td>150</td>
<td>15</td>
<td>10</td>
<td>McEvedy</td>
<td>1962</td>
<td>150</td>
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<td>Total</td>
<td></td>
<td>602</td>
<td>44</td>
<td>7.1</td>
<td>Total</td>
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<td>602</td>
</tr>
</tbody>
</table>

INCIDENCE

In published series of ganglia, those arising from the flexor tendon sheaths have constituted a variable proportion (Table 1).

Of the forty patients in the series, one had ganglia in two digits simultaneously. In another case, at follow-up three years after initial excision, a similar swelling had appeared on one of the fingers of the opposite hand.

The youngest patient was aged seven months and the oldest seventy-three years. The average age was 28.8 years. The well known preponderance of ganglia in the second, third and fourth decades was again evident (Fig. 1).

There were twenty-eight females and twelve males in the series. This is in accord with previous findings, Carp and Stout (1928) having recorded a female preponderance of 3:1, McEvedy (1962) 2:1, Hvid-Hansen (1970) 3:1 and Nishiyama, Akahori and Sakane (1970) 2:1. Hvid-Hansen suggested that the desire for cosmetic perfection among young women might be a significant factor in this female bias but it is impossible to accept this in relation to ganglia of the flexor tendon sheaths which are hardly ever visible, let alone conspicuous.

No familial tendency was noted and there was no association with other joint disorders or general disease. Four of the patients gave a history of having had a ganglion on the back of the wrist some time in the past.
GANGLIA OF THE FLEXOR TENDON SHEATHS IN THE HAND

SITE

Cases were equally divided between the right and left hands and there was no clear relationship between the side of the lesion and the dominant hand.

The frequency with which individual digits were affected is shown (Table II).

The ganglia arose from the tendon sheaths at two distinct levels. In the fingers, twenty-eight were over the middle of the proximal phalanx at the level of the proximal skin crease (Fig. 2) and ten were at the level of the metacarpo-phalangeal joint. Those arising from the tendon sheath of flexor pollicis longus were all at the level of the metacarpo-phalangeal joint.

<table>
<thead>
<tr>
<th>Digit</th>
<th>Right hand</th>
<th>Left hand</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Index</td>
<td>4</td>
<td>4*</td>
<td>8</td>
</tr>
<tr>
<td>Middle</td>
<td>14</td>
<td>12*</td>
<td>26</td>
</tr>
<tr>
<td>Ring</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Little</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

* Includes one case with similar ganglia affecting the index and middle fingers of the same hand.

CLINICAL FEATURES

The usual complaint is of the presence of a tender nodule at the base of the finger which interferes with activities requiring a firm grip. Often the patients complain of tenderness but are unaware that a lump is present. A few patients consulted their doctors because they were worried about the lump and all three infants in the series were brought for medical advice because the parents were worried.

The average interval between first noticing symptoms and attendance at hospital was 9.7 months. This compares with two and a half years for ganglia in general (Lyle 1941) and reflects on the greater disability which they cause.

None of the patients noticed any increase in the size of the lump from the time when they first became aware of it.

The ganglion has a characteristic clinical appearance. It is a hard, discrete swelling, easier felt than seen, varying in size from that of a match head to a pea, and lying on the flexor aspect of the base of the finger or a little more proximally in the palm. It is smooth, dome-shaped and tender to palpation. It does not move with the tendon and appears fixed to the bone when the finger is fully extended. On flexion of the finger, slight lateral mobility can sometimes be demonstrated. In none of the cases in this series was there any adherence of the ganglion to the skin as described by Carp and Stout (1928).

The ganglia are often misdiagnosed. Frequently confused with tender sesamoid bones, they also have to be distinguished from osteomas, chondromas and implantation dermoids.

THE ROLE OF INJURY AND OCCUPATIONAL FACTORS

The possible role of injury in the formation of ganglia has been discussed by various authors since Eller in 1746 suggested that they might originate from a localised rupture of the tendon sheath with extrusion of synovial fluid. Doyle (1946) believed that a rent in the synovial membrane healed but left an extracapsular attached piece of synovial membrane which continued to secrete synovial fluid. Bunnell (1964) found a history of trauma in

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approximately half the cases of ganglia which he had studied but thought that a single direct injury was unlikely to be a cause. In only 10 per cent of McEvedy's (1962) cases was there a history of direct trauma as a possible cause. Bruner (1963), however, commenting on the treatment of ganglia of the flexor tendon sheaths, considered that they often followed a specific single injury, such as bending the finger backward, lifting a heavy suitcase or using a can opener.

In the present series, a history of injury was obtained from only one patient, a twenty-two-year-old lorry driver who stated that he had received a direct blow on his finger at work three days before the lump appeared. At operation, three weeks later, the ganglion was found to be typical in all respects. It is concluded that a single specific injury is unlikely to be an important factor in the formation of ganglia of the flexor tendon sheaths.

Repeated minor trauma might play some part in producing ganglia: Bunnell (1964) accepted this as a causative factor on the basis of the usual location of the lesions. Stack (1964) considered that it might initiate a degenerative process which would precede ganglion formation. In the series of Barnes, Larsen and Posch (1964), however, a history of repetitive actions was only present in 4 per cent of cases. McEvedy (1962) was unable to find any particular occupational incidence and concluded that there appeared to be no increased risk of ganglion formation in work of a repetitive nature.

In this study, confined to ganglia of the flexor tendon sheaths, patients were questioned in detail about their work and hobbies. Although there was a wide variety of occupations, none of the patients were employed in heavy manual work. Eleven of the forty patients were full-time typists using manual typewriters for most of their working day; they had been doing this work for from three months to six years before the ganglion was first noticed. In all these typists, the middle finger was affected and always at the same level, over the middle of the proximal phalanx.

**PATHOLOGY**

The ganglia are generally between 3 and 8 millimetres in diameter and are dome shaped. They are intimately attached to the tendon sheaths at their bases. Unlike ganglia at other
sites they are unilocular, and cystic offshoots from the main cyst are not seen. The walls are thin and the contents vary from a viscous fluid to a jelly-like material.

On microscopic examination the wall of the ganglion consists of fibrous tissue with a variable number of fibroblasts (Fig. 3). There is no true lining membrane, but in the smaller ganglia there is a tendency for the fibroblasts to aggregate on the surface in some areas. At the base of the ganglion the wall is in continuity with the tendon sheath and in this region minute "capsular cysts" are often visible (Fig. 4). These are areas in which the collagen fibrils are irregularly arranged and broken up into fine threads, with scattered spindle-shaped or polygonal cells and occasional round spaces with neither cells nor fibres. They are considered...
to represent changes of degeneration. The contents of the ganglia are usually dispersed during preparation; when they persist the appearance on light microscopy is of a structureless, acellular material.

**TREATMENT**

Rupture by direct pressure has been used for many years as a simple method of treatment of ganglia but it is less applicable to ganglia of the flexor tendon sheaths because of their small size and tenderness. Bruner (1963) reported good results in fifteen of these cases following needle rupture through a wheal raised by a local anaesthetic. The same technique was used in five of the present series of cases with satisfactory results in three. Thirty-four ganglia were treated by excision, either as a primary procedure or after failed needle rupture. A bloodless field was used and the exposure was through a skin crease incision. The ganglion could readily be excised intact together with the small disc of tendon sheath from which it arose. At follow-up from three months to three years after operation, there was no recurrence and all patients were symptom free.

**DISCUSSION**

One of the less common sites for the development of ganglion is the flexor tendon sheath of a finger or thumb. Ganglia arising here are usually small and unilocular. They show little tendency to increase in size with the passage of time. Unlike most other ganglia, they are tender—often acutely so—and the degree of disability they produce is out of all proportion to their size.

Although ganglia are commonplace lesions, there has been much controversy as to their pathogenesis and etiology. The possibilities that they might be retention cysts, neoplasms or herniations of tendon sheaths are no longer accepted. Based on histological evidence of degenerative changes and disintegration involving the cells and collagen fibres of the cyst wall, the most widely held view at present is that they are degeneration cysts. Recent electron-microscope studies (Ghadially and Mehta 1971) add weight to this argument. The concept of mucoid degeneration as the basis of ganglion formation has been challenged by McEvedy (1962). He suggested that the micro-cysts which are a common feature of the tendon sheath or capsule in the direct proximity of ganglia are in reality minute adventitious bursae and that it is by the distension of one of these that a ganglion originates. The occupational incidence which was noted in typists must be examined in the light of the foregoing. It is conceivable that the increased incidence is apparent rather than real in that the nature of their work aggravates the symptoms and forces the patients to seek advice. This seems unlikely, however, for none of the typists complained of pain during working hours and all symptoms were related to other activities. In all the typists the middle finger only was affected and the ganglion was always at the level of the middle of the proximal phalanx. It is tempting to suggest that in the position of flexion employed in typing, this is the part of the tendon sheath-pulley system which is most severely stressed. Changes might develop at this site, whether they be degenerative in nature or the formation of adventitious micro-bursae, which could progress to ganglion formation. As to treatment: it seems reasonable to attempt needle rupture in the first instance, but should the ganglion recur, surgical excision should be carried out. The results of this are excellent. The ganglion does not recur, presumably because it and the portion of tendon sheath from which it arises can be removed en bloc.

**SUMMARY**

1. The features of ganglia of the flexor tendon sheaths of the hand are described.
2. A high incidence in typists is discussed in relation to etiology and pathogenesis.
3. The suggestion is made that needle rupture is the method of choice, with surgical excision in case of recurrence.

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REFERENCES


