

## TRIANGULAR CARTILAGE CALCIFICATION IN THE WRISTS: ITS INCIDENCE IN ELDERLY PERSONS\*

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**C**ALCIFIED articular or fibrous cartilage in association with primary hyperparathyroidism has been recognized since it was reported independently by Eklöf in 1952<sup>6</sup> and Bywaters in 1959.<sup>2</sup> Calcification of the triangular cartilage in the wrists is common in primary hyperparathyroidism.<sup>5</sup> This cartilage is a triangular fibrocartilage disk which lies in the plane of the wrist. The apex of the triangle is attached to the ulnar styloid and the base to the medial free edge of the distal radius. Because roentgenograms of the hands and wrists are frequently obtained in patients in whom primary hyperparathyroidism is suspected, knowledge of the incidence of calcification of the triangular cartilage, in otherwise normal individuals, becomes important.

### MATERIAL AND METHOD

The radiodiagnostic index of the Radiology Department of the University of California San Francisco Medical Center was surveyed for the years 1965 and 1966. During this period 280 patients, 60 years of age or older, were registered for roentgenograms of the wrists, or of the hands and wrists. From this group, patients with gout, rheumatoid arthritis, hyperparathyroidism, and hypercalcemia were excluded, since these conditions have been reported in association with cartilage calcification.<sup>3,4,8,11</sup>

The roentgenograms of the 202 remaining patients (63 males and 139 females) were surveyed for the presence of triangular cartilage calcification in the wrist. The mean age for this group was 69.4 years (range, 60 to 89 years). The recorded indications for roentgenograms were: trauma, 85; arthralgia, 53; miscellaneous, 60; and indication not listed, 14. Fractures were

demonstrated in 58 instances and moderate to advanced osteoarthritis in 72. In 100 of the 202 patients, roentgenograms had been obtained of both wrists.

### RESULTS

Calcification of the triangular cartilage was demonstrated in 5 of the 202 patients (2.5 per cent) (Table 1; Fig. 1 and 2). The mean age of the 5 patients with such calcification was 74.2 years (range, 69 to 87 years), whereas it was 69.4 years (range, 60 to 89 years) for the 198 patients without this calcification. Roentgenograms of both wrists had been obtained in all 5 patients with calcification of the triangular cartilage. The calcification was bilateral in 3 and unilateral in 2. Cartilage calcification of the shoulders or hips in all 5 patients was not evident on roentgenograms of the chest and abdomen. None of the 5 had had roentgenograms of the knees. In 3 of the 5 patients, significant osteoarthritis was present in the wrists. In 1 patient the osteoarthritis was unilateral and appeared to be post-traumatic.

Detailed hospital records, available on all 5 patients with cartilage calcification of the wrists, showed that 3 of the 5 patients had had wrist pain. None had complained of symptoms referable to other joints nor was there a history of renal calculi. In 2 patients, the serum calcium was measured and found to be normal. The uric acid in these 2 was slightly elevated. Nothing in the records of any of the 5 patients suggested gout, pseudogout, or hyperparathyroidism.

### DISCUSSION

Joint cartilage may become calcified for unknown reasons, or may be associated with degenerative changes, gout, hemo-

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TABLE I  
PATIENTS WITH CALCIFICATION OF THE TRIANGULAR CARTILAGE

Case No.	Sex	Age	Symptoms	Roentgenographic Changes	Triangular Cartilage Calcification
I	F	71	Arthralgia	Osteoarthritis	Bilateral
II	M	70	Arthralgia	Post-traumatic arthritis; old fracture, right	Right wrist
III	F	87	None	Osteoarthritis	Bilateral
IV	F	69	None	Short fourth metacarpal	Bilateral
V	F	74	Arthralgia	Osteoarthritis	Right wrist

chromatosis, ochronosis, or primary hyperparathyroidism.<sup>4</sup> A recent review of 91 patients with proven primary hyperparathyroidism disclosed calcified joint cartilage in 18 per cent, most of whom had triangular cartilage calcification in the wrists.<sup>5</sup> In this series osteoarthritis of the wrist was evident in only one instance. Roentgen evidence of osteitis fibrosa, such as subperiosteal resorption or cyst formation, was absent in one-half of these patients.

Cartilage degeneration associated with aging can result in calcification.<sup>10</sup> Bocher *et al.*,<sup>1</sup> in a study of patients averaging 80 years of age, demonstrated a 7 per cent incidence of meniscal or articular cartilage calcification. These authors attributed the calcification to degeneration. In the present series, the 5 instances of cartilage calcification of the wrists are also considered as

secondary to degeneration of cartilage. The incidence of 2.5 per cent calcification of the triangular cartilage in an elderly population is low. Perhaps the lower incidence in the wrists (2.5 per cent) compared to that noted by Bocher *et al.*<sup>1</sup> in the knees (7.0 per cent), is related to the difference in the mean age of the two groups (69 *versus* 80 years). It may also be a result of more severe degeneration in the cartilage of the knees from stress of weight bearing.

Pain in the wrist was the complaint of 3 of the 5 patients with triangular cartilage calcification. The arthralgia may have been the result of the coexisting osteoarthritis, however, rather than of the cartilage calcification. In none of the patients was the arthralgia of an acute inflammatory nature.

Because triangular cartilage calcification of the wrists is common in primary hyper-



FIG. 1. Case I. The right wrist of a 71 year old woman in whom triangular cartilage calcification was bilateral. Degenerative changes are present in the first metacarpal-greater multangular joint.



FIG. 2. Case III. The left wrist of an 87 year old woman with bilateral triangular cartilage calcification. Sclerotic degenerative changes are present in the first metacarpal-greater multangular and navicular-greater multangular joints.

parathyroidism but uncommon, even in an aged normal population, its presence when primary hyperparathyroidism is suspected tends to support the diagnosis. If calcification of the triangular cartilage is noted as an incidental roentgen finding, primary hyperparathyroidism should be excluded.

On most of the routine roentgenograms available, the authors could not distinguish degenerative calcification of the triangular cartilage from that seen with primary hyperparathyroidism. McCarty *et al.*<sup>7</sup> and Parlee, Freundlich and McCarty<sup>9</sup> reported that demonstrated linear and punctate calcium deposits in hyaline and fibroarticular cartilage are almost pathognomonic of the calcium pyrophosphate crystals. Degenerative cartilage calcification is believed to be associated with apatite crystals. The roentgen appearance of calcification of the articular cartilage in primary chondrocalcinosis (pseudogout) and that associated with primary hyperparathyroidism is similar. Perhaps if industrial x-ray film, type M, were employed for finer detail, the distinction between degenerative triangular cartilage calcification and that related to primary hyperparathyroidism could be appreciated.

#### SUMMARY

In an elderly population of 202 patients, with a mean age of 69.4 years, calcification of the triangular cartilage of the wrists was present in 5 patients (2.5 per cent). This finding was thought to be associated with degeneration of the cartilage. Since cartilage calcification in the wrists is a common finding in primary hyperparathyroidism and may occur without roentgen evidence of periosteal resorption, its presence in patients in whom parathyroid hyperfunction is suspected supports the diagnosis. If triangular cartilage calcification is noted as an incidental finding, primary hyperpara-

thyroidism, among other conditions causing cartilage calcification, should be excluded.

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