INTRODUCTION
Osteoarthritis (OA) of the thumb carpometacarpal (CMC) joint is a common and painful disease that often carries significant disability. The precise etiology, however, remains unclear. One etiologic theory focuses on the anatomic variations of the abductor pollicis longus (APL) tendon, inserting at and around the thumb CMC joint. It has been suggested that accessory slips of APL tendon inserting on the thenar musculature (most often the abductor pollicis brevis) unfavorably alter joint compressive forces, and accelerate the degeneration of the thumb CMC joint cartilage.1 Release of these accessory tendons has therefore been recommended for the treatment of early CMC arthritis. To elucidate this theory, this pathologic and radiographic study investigates the relationship between thenar insertion of accessory APL tendons and CMC osteoarthritis.

METHODS
Sixty-eight cadaver hands were radiographically staged (using the Eaton and Glickel system2 for CMC OA) and dissected: 31 female (mean age, 56 years; range, 18-88 years) and 37 male (mean age, 60 years; range, 28-79 years). During antegrade dissection, the tendon of the abductor pollicis longus muscle was carefully examined, and the presence or absence of a thenar slip was noted. The thumb CMC joint was then opened, and the articular surfaces of the metacarpal and trapezium were visually graded for osteoarthritic involvement (Table 1). The overall condition of the joint was assigned the pathologic grade that matched the worst area of cartilage degeneration noted on either articular surface.

RESULTS
Thirty-five of sixty-eight specimens (51%) had an accessory thenar insertion of the APL tendon. Most frequently, the thenar tendon inserted on the fascia or muscle belly of either the abductor pollicis brevis (Figure 1) or opponens pollicis muscles. As shown in Table 2, no significant correlation with the presence or severity of osteoarthritis was noted, as assessed by radiographic stage or visual pathologic grade (p=0.30, power 0.88). Age had a clearly significant and direct correlation with the severity of osteoarthritis of the thumb CMC joint (p<0.001). Under the grading system used, sex did not seem to have an effect on the severity of osteoarthritis in this group of specimens.

TABLE 1 - GRADING SYSTEM OF CMC ARTICULAR CARTILAGE3

| Grade 1 | Normal cartilage
| Grade 2 | Early cartilage degeneration
| Grade 3 | Progressive cartilage degeneration
| Grade 4 | End-stage cartilage degeneration

Fibrillation
Localized pitting less than or equal to 25% of full thickness
Exposed bone
Deep fissures or clefts
Localized pitting greater than 25% of full thickness
Eburnated bone

FIGURE 1 - THENAR SLIP PHOTOGRAPH

DISCUSSION
A considerable number of studies have convincingly demonstrated that the tendinous anatomy of the abductor pollicis longus is extremely variable, as are the sites of insertion. Most frequently, two to four tendinous slips are present in the first dorsal compartment, although as many as seven have been reported. This study focused on APL tendon slip insertion into the thenar musculature, and the results (51%) are comparable with those of previous studies.

The precise biomechanical effects of the individual APL musculotendinous subunits will require further study before their etiologic role, if any, is identified. However, the results of these radiographic and pathologic findings do not support the involvement of thenar APL insertion in osteoarthritic involvement of the thumb CMC joint. Age is clearly shown to be a significant factor, which is quite consistent with existing clinical and epidemiologic data. In this study group, where thenar slip presence or absence was noted, there was no statistical difference in CMC pathologic grade between genders. However, previous biomechanical analysis on the same group of specimens has demonstrated that softening of cartilage as a result of OA occurs earlier in females than in males when analyzed as a function of age.4 In conclusion, this study suggests that an accessory thenar insertion of the APL tendon is a benign and common variant of thumb anatomy, with no demonstrable pathologic association with thumb carpometacarpal osteoarthritis.

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