

Opponens Pollicis Fatty Infiltration in Thumb Carpometacarpal Osteoarthritis: New Finding

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Introduction: Thumb-Carpometacarpal (CMC) Osteoarthritis (OA) is a common and disabling condition with frequent poor outcomes after surgical treatment, including slow recovery, persistent instability, and weakness. In addition to rotating the thumb to face the fingers, the Opponens Pollicis (OPP) stabilizes the Thumb-CMC joint during pinch. While studying the detailed anatomy of the thenar muscles, we serendipitously discovered two cases of fatty infiltration (FI) of the deep head of the OPP in cadavers with Thumb-CMC OA. In this study we aimed to answer to three questions: 1) what is the prevalence of OPP FI in populations with and without thumb-CMC OA; 2) what are the risk factors for developing FI; 3) to identify if FI affects other thenar eminence muscles.

Methods: 790 consecutive 3T wrist and hand magnetic resonance imaging (MRI) studies performed in our institution over a 12 month period were analyzed for evidence of FI in the hand intrinsic muscles. This population was divided in two cohorts based on Xray analysis: a cohort with thumb CMC OA (n=330) and a second cohort without thumb CMC OA (n=460). We staged the thumb CMC OA using Eaton's classification. A statistical analysis using a logistic regression model was performed to investigate the factors of age, sex and OA severity for the presence of FI in these images.

Results: In the thumb CMC OA cohort, OPP FI was present in 153 patients (46%). FI, when present, was located only in the deep belly of the OPP. We found no OPP FI in the cohort without thumb CMC OA (460 patients). In the thumb CMC OA cohort 122 patients (80%) were older than 60y.o. No FI was found in patients with Eaton stage I and all patients with Eaton stage 4 (n=30) had FI. Twenty-one patients had had a trapeziectomy to treat their OA, so Eaton stage could not be determined, but 20 of these 21 had FI noted. As shown in Table 1, increasing age and, especially, advanced OA stage were significant predictors for the presence of OPP while CMC is more common in women, gender was not independently associated with the presence of FI.

Discussion: OPP FI is found to be a frequent finding in Thumb CMC osteoarthritis that could help explain poor outcomes after surgery, due to the role of this muscle in stabilizing the joint. The insertion of the OPP deep belly on the thumb CMC joint capsule, where palmar osteophytes develop in advanced stage CMC OA, suggests a potential mechanism for the development of FI, with osteophyte impingement damaging the structure of the muscle leading to its fatty degeneration. In the future, we plan other studies to analyze clinical outcomes in CMC OA patients with and without FI, and more focused in vivo studies of OPP function.

Clinical Relevance: OPP FI could potentially alter the function and the stability of the thumb CMC joint in patients with CMC OA.

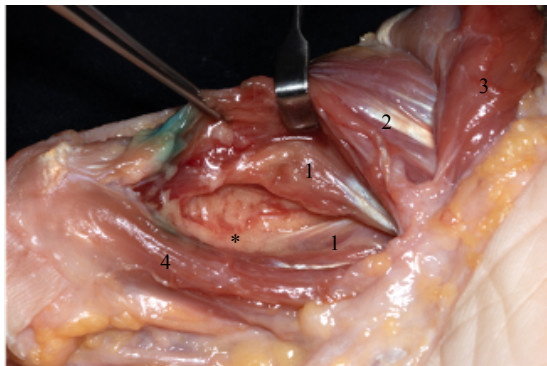


Figure 1: Right hand dissection in patient with Thumb CMC OA. Presence of intramuscular fatty infiltration of the OPP deep belly (*). 1: OPP deep belly. 2: retracted OPP superficial belly. 3: Abductor Pollicis Brevis. 4: superficial flexor pollicis brevis



Figure 2: 3T Hand MRI (coronal T1 sequence) in patient with thumb CMC osteoarthritis. Note the osteophyte developed ulnarly in the trapezium (T) and the OPP deep belly fatty infiltration (*). First metacarpal (M1).

Variable	OR (95% CI)	P Value
Sex (338M,452F)	0.743 [0.415, 1.330]	P=0.317
Age (6,87)	1.033 [1.001, 1.0065]	P=0.042
Osteoarthritis Severity	10.027 [5.882, 17.093]	P<0.001
Eaton Classification: (n total OA; n With FI): I (28;0). II (103;16). III (148;88). IV (30;30)		

Table 1: predictor factors analysis for the presence of OPP FI