Characteristics of Accelerated Hand Osteoarthritis: Data from the Osteoarthritis Initiative

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Osteoarthritis (OA) is often thought of as a gradually progressing disease. However, some individuals will develop an accelerated form of OA, in which their joint progresses from normal appearance on radiographs to advanced-stage disease in as little as 48 months and often in just 12 months.

This has been described at the knee, hip, and occasionally at the shoulder. It's an important group of individuals because they often report more pain and dysfunction, even before the onset of their disease, compared to their peers.

Unfortunately, it remains unknown if the small joints of the hands also develop an accelerated form of OA. Therefore, we aim to determine whether hand joints develop an accelerated form of OA and to characterize the individuals who develop accelerated hand OA. We had hypothesized that such a subset exists and that those with accelerated hand OA would have more erosions than those without accelerated hand OA.

To achieve our goals, we used data from the Osteoarthritis Initiative (OAI), which is a cohort based out of the United States which was recruited at 4 clinical sites. We required all of the participants to have good quality radiographs of the dominant hand at baseline and 48 months. We excluded individuals who had radiographic evidence of musculoskeletal pathology other than OA, such as suspected rheumatoid arthritis. We also excluded individuals who had radiographic scores missing because of poor positioning of the hand on the radiograph.

We conducted person-based analyses and used radiographic disease severity, which was assessed on the posteroanterior radiographs of the dominant hand, specifically we scored 16 joints using a modified Kellgren-Lawrence (KL) grading system. The reader read the images side by side for baseline and followup but blinded to time.

We defined accelerated hand OA as having 1 joint or more that progressed from KL grade 0/1, which would be a normal appearance, to 3/4 within 4 years. Hence this would require a person to develop definite osteophyte and definite joint space narrowing.

We also extracted demographic, anthropometric, and additional characteristics from the publicly available dataset and considered these as potential risk factors. The OA protocols and data are publicly available online.

Overall, we found that about 1% of the cohort developed accelerated hand OA within the first 4 years of the OAI. This included 37 hands with 1 joint affected and 1 hand that had 2 joints affected. Adults who developed accelerated hand OA typically were more female, older, and more likely to have hand pain at baseline prior to the onset of disease.

We also observed that individuals with accelerated hand OA were more likely to have radiographic OA in another joint at baseline. They were also more likely to have central or marginal erosions at baseline.

Furthermore, over the course of the 48 months, the individuals with accelerated hand OA were more likely to develop new erosions in 48 months at 1 or more joint. Interestingly, this was typically found at a joint that did not develop accelerated hand OA, but at a distant joint.

Here you can see an example where we have an individual who had a normal appearing X-ray at baseline at their second distal interphalangeal joint and by followup at 48 months had already developed significant joint space narrowing and developed accelerated hand OA and central erosion.

The most common locations for accelerated hand OA were the first carpometacarpal joint (CMC) and the second metacarpophalangeal (MCP) joint. You can see here an example of a joint that developed accelerated hand OA at the first CMC joint.

In conclusion, we observed that accelerated hand OA was more common at the first CMC joint and the second MCP joint. This is in contrast to what we would observe in typical hand OA, where it is the interphalangeal joints that are commonly affected. Furthermore, it's very rare for us to see in hand OA that we have an isolated MCP joint OA.

Finally, it's an interesting note that the second MCP joint and the first CMC joint are typically involved in grasping. This leads to a potential hypothesis that accelerated hand OA may be related to certain occupational exposures. Associations between erosive OA and accelerated hand OA also warrant further exploration. It's been noted in the past that central erosions are risk factors for cartilage loss, and it's been observed in the past that accelerated OA has been associated with subchondral fractures and bone pathology. Therefore, it's interesting to question what commonalities and what common pathways may be influencing both the development of erosions and accelerated OA.

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