

# Longitudinal change of hip osteoarthritis: A video presentation

Toru Uchiyama

## CASE REPORT

A woman first visited our clinic in her teens with right hip pain and continued to be followed up until her 40s. She did not accept joint replacement surgery due to childcare and housework commitments.

## Imaging

The earliest available image is from 2006, coinciding with the introduction of our digital imaging system. The study materials comprise 10 anteroposterior (AP) views of the hip, taken biennially since 2006 through 2024. We manually performed image alignment to ensure consistency across the longitudinal series. Then, the region of interest (ROI) was manually set and cropped at 2000×1000 pixels, with the cranial side approximately one finger breadth from the acetabular rim and the caudal side at the proximal 1/3 of the femur (Figure 1). One image was rotated so that the ischium is parallel to the ground. We utilized Runway [1], an AI-based video generation platform with frame interpolation technique, to create a video presentation of the longitudinal changes in hip osteoarthritis.

In our video (Video 1), over the period from 2006 to 2016, we observed joint space narrowing (grade 3) and subsequent joint space obliteration (grade 4) according to the Kellgren and Lawrence grading system [2]. Since 2018, although there has been significant flattening of the femoral head and the presence of osteophytes in the acetabulum, a restored joint space appearance has been observed.

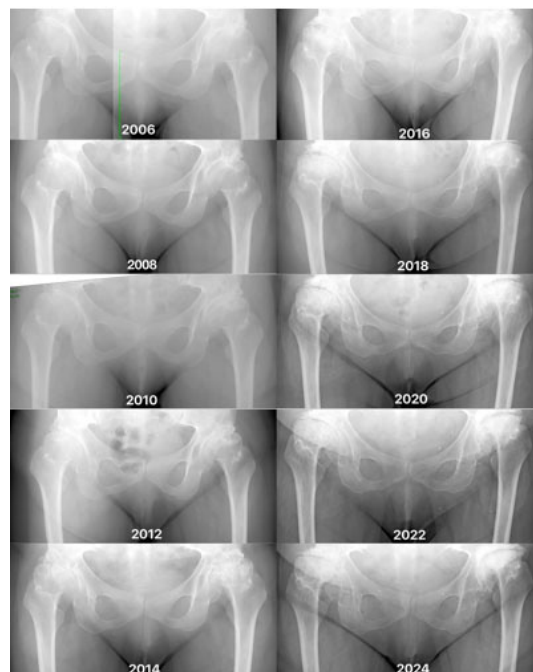
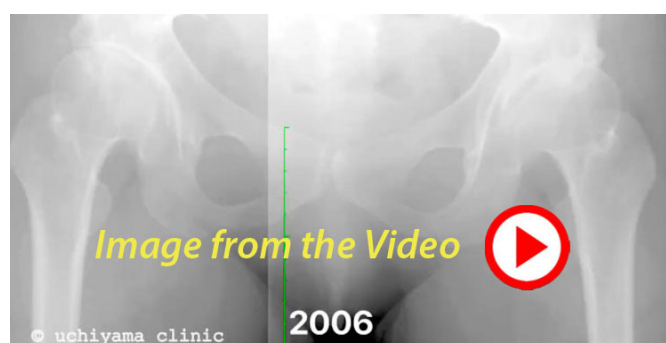


Figure 1: A series of longitudinal plain X-rays of the hip joint taken biennially since 2006 through 2024.



Video 1: A video generated with frame interpolation technique using 10 anteroposterior (AP) views of the hip, taken biennially since 2006 through 2024.

**Video 1 URL:** <https://www.ijcasereportsandimages.com/archive/article-full-text/101486Z01TU2024#video1>

**Access Video  
on other devices**



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## DISCUSSION

Hip osteoarthritis is a progressive condition that can significantly impact a patient's quality of life. Visualization of disease progression over time can be challenging using traditional static imaging techniques. This case report introduces a novel approach using an AI-generated video to illustrate the long-term changes in hip osteoarthritis.

Video presentations of longitudinal changes in medical images can provide a more comprehensible illustration compared to sequences of still images. While digital morphing has been used to create videos from still images, this technique often results in non-smooth transitions. Frame interpolation, an AI technique, offers smoother and more natural transitions.

The use of AI-based platforms like Runway allows for the creation of such videos without requiring extensive technical skills. AI-based video generation enhances disease progression visualization, benefiting medical education, and patient communication. However, its use requires caution. Video quality depends on input data, and AI interpolation may be less accurate in atypical cases. Ethical considerations and current AI limitations must be acknowledged. Uploading clinical images to cloud-based systems such as Runway raises concerns regarding the protection of personal information. It is crucial to ensure thorough anonymization and take precautions to prevent any potential leakage of personal data. From this perspective, methods to implement frame interpolation locally, without relying on cloud systems, have also been proposed [3]. However, these approaches require a considerable level of technical expertise. When used appropriately, this technology can significantly improve medical image analysis.

Our observations suggest potential for expanding the Kellgren and Lawrence grading system beyond grade 4. Future research might consider new categories for late-stage osteoarthritis, pending more cases, analysis, and expert consensus. This opens avenues for studying long-term osteoarthritis progression and classification.

## CONCLUSION

This case report demonstrates the potential of AI-generated video presentations in visualizing the long-term progression of hip osteoarthritis. While this study is limited to a single case, it provides a foundation for future research into longitudinal changes in other types of osteoarthritis, including those associated with dysplasia or rheumatoid arthritis, as well as the visualization of fracture healing processes in children.

**Keywords:** AI-generated video, Frame interpolation, Hip osteoarthritis, Longitudinal change

### How to cite this article

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## Author Contributions

Toru Uchiyama – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

## Guarantor of Submission

The corresponding author is the guarantor of submission.

## Source of Support

None.

## Consent Statement

Written informed consent was obtained from the patient for publication of this article.

## Conflict of Interest

Author declares no conflict of interest.

## Data Availability

All relevant data are within the paper and its Supporting Information files.

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