

RADIOGRAPHIC EXAMINATION OF GENU IN CASES OSTEOARTHRITIS (OA)

*Aryadiva Nugrahaning Prayoga, Indah Sulistyowati

Widya Husada Semarang University

Email Korespondensi: divaprayoga988@gmail.com

Submitted: Jun 17th 2024 Revised: Jun 25th 2024 Accepted: Aug 1st 2024 Published Online: Sep 13rd 2024

ABSTRACT

Osteoarthritis is a degenerative joint condition. This causes pain, swelling and stiffness, affecting a person's ability to move freely. Osteoarthritis attacks the entire joint, including the surrounding tissue. This most often occurs in the knees, hips, spine and hands. The severity of osteoarthritis is often evaluated through the appearance of the knee joint gap on the radiograph that has been made. The genu radiography procedure is a non-contrast radiological examination of the genu using x-rays to evaluate anatomical abnormalities in the genu. The aim to be achieved in this research is to determine the procedure for genu radiographic examination in cases of genu osteoarthritis (OA). The type of research used was descriptive qualitative research which was used to determine the Genu Radiographic Examination procedure in Genu Osteoarthritis (OA) Cases. The research sample used was patients at RSI Kendal. Based on research regarding the Genu radiographic examination procedure for Genu Osteoarthritis (OA) cases without any special preparation for the patient, the patient is only asked to remove and free the leg or knee area from objects that are present. can interfere with radiographic images. The tools and materials used in the examination include an x-ray plane, examination table, imaging plate measuring 35 x 43 cm, and a computed radiography device. The projections used are anteroposterior projection and lateral projection.

Key words: genu, radiography, osteoarthritis.

BACKGROUND

In 2019, approximately 528 million people worldwide suffered from osteoarthritis; an increase of 113% since 1990. About 73% of osteoarthritis sufferers are over 55 years old, and 60% are women. With a prevalence of 365 million people, the knee is the joint most frequently affected, followed by the hip and hand. Three hundred and forty-four million people living with osteoarthritis have a degree of severity (moderate or severe) that requires rehabilitation. With an aging population and increasing obesity and injury rates, the prevalence of osteoarthritis is expected to continue to increase globally (WHO, 2023). One of the ways to diagnose a disease can be done by radiological examination. However, the lack of public knowledge about radiological examinations to diagnose a disease makes people afraid to undergo radiological examinations because of the radiation effects that may be received (Utami, Prayoga and Rosidah, 2024).

The knee or *Articulatio genu* is a bicondylar articulation that functions as a pivot-hinge joint and has two axes of motion. The transverse axis used in extension and flexion movements is stretched between the two femoral condyles. The longitudinal axis used in rotational movements is located eccentrically and vertically through the mediale intercondylar tubercle (Friedrich Paulsen, 2013). According to (Lampignano, J. P., & Kendrick, 2018), The genu is the largest joint that connects the femorotibial joint between the tibial condyles. The patellofemoral joint is part of the genu, the patella articulates with the anterior surface of the distal femur. The patella is located on the anterior part of the main joint, but does not enter the knee joint formation (Pearce. E. C, 2013).

The severity of osteoarthritis is often evaluated through the appearance of the knee joint gap on the radiograph that has been made. Under normal circumstances, joint gap radiographs have a distance of 0.5 cm (A.E. Nelson, 2017). Radiography is the first imaging technique and plays an important role in the evaluation of patients with suspected OA. Before the development of various imaging modalities, imaging of OA was only based on conventional radiography, where radiographically detected joint space narrowing actually represented the final stage of OA. But until now, radiographic joint space measurement is still recommended by regulatory bodies in the United States (Human and Administration, 2018). The genu radiography procedure is a non-contrast radiological examination of the genu using x-rays to evaluate anatomical abnormalities in the genu (Lampignano, J. P., & Kendrick, 2018). The use of conventional radiology tools is the standard for diagnosing OA. The radiology tool itself is used to see structural changes in the bone. This diagnosis can be made after finding several characteristics of OA such as narrowed joint space, subchondral sclerosis and osteophytes. Osteophytes are bone growths that occur when joints are affected by arthritis. Osteophytes are closely related to the onset of pain. In the area of the joint that is exposed to high pressure, radiography can show

a thinning joint space, and there is also subchondral sclerosis (Price, S.A., dan Wilson, 2006).

The projection that can be used to clinically establish osteoarthritis of the genu is the bilateral weight bearing Antero-Posterior projection. This projection is to see indications of genu pathology, including fractures, dislocations, osteoporosis, osteoarthritis, tumors and others. The projections that are usually used in clinical knee joint examinations for osteoarthritis are Antero-Posterior weight bearing, Lateral (mediolateral) and additional projections, namely Skyline (Braun, Hillary J., 2012). Radiographic examination in cases of arthritis of the knee joint is recommended by Leach, Gregg and Siber to use the AP (Antero Posterior) weight-bearing projection comparison between the two paired joints. This weight-bearing position will show the condition of the knee joint that is in accordance with the anatomical conditions of the normal knee (Ballinger and Frank, 2003). Meanwhile, according to Merrill's theory, radiographic examination of the genu in cases of osteoarthritis uses AP and lateral projections (Ballinger, Philip W, 2003). Based on the background above, the author is interested in studying further in the research entitled "Management of Genu Radiographic Examination in Cases of Genu Osteoarthritis (OA)".

METHOD

This type of research is descriptive qualitative research with a case study approach which is used to describe or describe the original situation systematically and accurately regarding the Management of Genu Radiographic Examinations in Genu Osteoarthritis (OA) Cases at the RSI Kendal Radiology Installation. Qualitative research methods are a process of inquiry (questions/investigation) regarding the understanding of something to obtain data, information, texts, and views of respondents using various methodologies in a social or humanitarian problem or phenomenon (Satori, Djam'an & Komariah, 2017). The case study research method is research that describes a comprehensive explanation of aspects of an individual, a group, an organization so that in this research the researcher must process as much data as possible regarding the subject being studied (Mulyana, 2018). The location of the research was at the RSI Kendal Radiology Installation. The research was conducted from September 2023 to August 2024. The research subjects used in this study were 1 patient and 3 radiographer data at the RSI Kendal Radiology Installation. The collected data is made in the form of transcripts. After that, the data is processed using open coding charts.

Data analysis is carried out by presenting data in the form of quotations, namely excerpts from respondents' statements so that conclusions and suggestions can be drawn.

RESULT AND DISCUSSION

Research on the management of genu radiographic examinations in cases of genu osteoarthritis (OA) carried out at the RSI Kendal Radiology Installation. The object of this research is a radiographic examination of Genu Osteoarthritis (OA) Cases at the Radiology Installation of RSI Kendal. History The patient came to the RSI Kendal Radiology Installation with a letter requesting a Genu radiography examination, with the identity of a 66 year old woman. Based on the research data obtained, the preparation of tools and materials for the Genu radiographic examination of Genu Osteoarthritis (OA) cases at the RSI Kendal Radiology Installation includes an x-ray plane, examination table, imaging plate measuring 35 x 43 cm, and a computed radiography device.



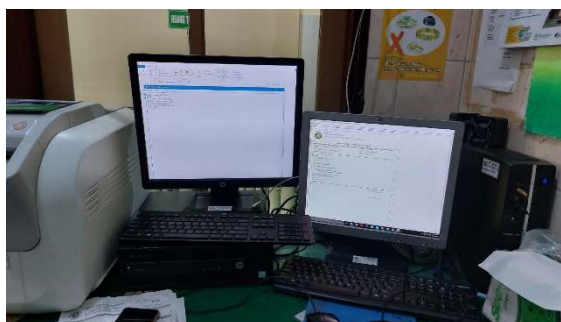
Picture 1. X-ray at the RSI Kendal Radiology Installation

Based on the research data obtained, for the Genu radiographic examination of Genu Osteoarthritis (OA) cases at the RSI Kendal Radiology Installation there was no special patient preparation, the patient was only asked to remove metal objects or objects that could interfere with the image in the genu area.



Picture 2. Imaging Plate

Based on the research data obtained, for radiographic examination of Genu Osteoarthritis (OA) cases at the RSI Kendal Radiology Installation using anteroposterior and lateral projections. Anteroposterior projection position the patient sleeping on the examination table, with both knees straightened so that the patient is in true AP position. With the upper border 1/3 of the distal femur and the lower border 1/3 of the proximal cruris. Central ray is vertical perpendicular. Central point in the middle of the genu. FFD 100 cm, exposure factor kV 58 and mAs 6.25. The exposure technique is carried out when the patient is still and does not move.



Picture 3. Computed Radiography Device at the RSI Kendal Radiology Installation



Picture 4. Radiograph of Anteroposterior Projection Genu

Lateral projection positions the patient sleeping on the examination table with a tilted position to one side, either right or left. The patient's leg is flexed to form a 90° angle, the part of the leg that is not being examined can be placed forward. Do the same for the right and left knees. The upper border is 1/3 of the distal femur and the lower border is 1/3 of the proximal cruris. The central ray is vertically perpendicular and the central point is in the middle of the genu. FFD 100 cm, exposure factor kV 58 and mAs 6.25. The exposure technique is carried out when the patient is still and does not move.



Picture 4. Radiograph of Lateral Projection Genu

Based on research data obtained at the RSI Kendal Radiology Installation regarding radiographic examination procedures for Genu Osteoarthritis (OA) cases, the following data was obtained:

The Genu radiographic examination procedure for Genu Osteoarthritis (OA) cases carried out at the RSI Kendal Radiology Installation was carried out without any special preparation for the patient, the patient was only asked to remove and free the leg or knee area from objects that could interfere with the radiographic image. The tools and materials used in the examination include an x-ray plane, examination table, imaging plate measuring 35 x 43 cm, and a computed radiography device. The projections used are anteroposterior projection and lateral projection.

According to Lampignano, J. P., & Kendrick (2018), there is no special preparation for the patient before the examination is carried out, the patient is only asked to remove objects that could interfere with the radiographic image of the organ being examined. For preparation, the tools and materials used include an x-ray plane, image receptor measuring 24 x 30 cm, marker, PB and processing unit. According to Philip W. Ballinger, E. D. Frank (2007), the projections used are Antero Posterior Projection (AP Projection), Postero Anterior Projection (PA Projection), Lateral Projection (Mediolateral Projection), Weight Bearing Antero Posterior Projection, Oblique Antero Posterior Projection, Postero Anterior Weight Projection Bearing, and Postero Anterior Oblique Projection. Examination techniques. There are three projections that are routinely carried out in knee joint examinations in general, namely AP, Lateral, and oblique (medial and lateral). This is also supported by the statement of Lampignano, J. P., & Kendrick (2018), where for osteoarthritis the AP weight-bearing projection is used because it provides information that shows more clearly the condition of the joints when compared to the non-weight bearing (supine) technique.

According to the author, in general the genu radiographic examination procedure for Osteoarthritis (OA) genu cases carried out at the RSI Kendal Radiology Installation is in accordance with the theory, namely that there is no special patient preparation, the patient is only asked to remove objects in the genu area to be examined so as not to interfere with the radiograph results. The tools and materials used use a digital system, namely computer radiography, including using an x-ray plane, an imaging plate measuring 35 x 43 cm and a computed radiography device. The basic projections used are anteroposterior projection and lateral projection.

CONCLUSION AND SUGGESTION

Based on research data obtained at the RSI Kendal Radiology Installation regarding the Genu radiographic examination procedure for Genu Osteoarthritis (OA) cases carried out at the RSI Kendal Radiology Installation without any special preparation for the patient, the patient is only asked to remove and free the leg or knee area from objects that are present. can interfere with radiographic images. The tools and materials used in the examination include an x-ray plane, examination table, imaging plate measuring 35 x 43 cm, and a computed radiography device. The projections used are anteroposterior projection and lateral projection.

According to the author, in general the genu radiographic examination procedure for Osteoarthritis (OA) genu cases carried out at the RSI Kendal Radiology Installation is in accordance with the theory, namely that there is no special patient preparation, the patient is only asked to remove objects in the genu area to be examined so as not to interfere with the radiograph results. the tools and materials used are in accordance with theory, and the basic projections used are anteroposterior projection and lateral projection. It is recommended that when using cassettes and imaging plates, use an imaging plate size appropriate to the size of the object in order to limit collimation or the area of illumination.

REFERENCE

- A.E. Nelson (2017) 'Osteoarthritis year in review 2017: clinical'.
- Ballinger, Philip W, and E.D.F. (2003) *Volume Two Merrill's Atlas of Radiographic Positions and Radiologic Procedures Tenth Edition*. 10th edn. St Louis: Nuclear Medicine Communications Elsevier.
- Ballinger, P.W. and Frank, E.D. (2003) *Volume One Merrill's Atlas of Radiographic Positions and Radiologic Procedures, Tenth Edition*. 10th edn. St Louis: Elsevier.
- Braun, Hillary J., and G.E.G. (2012) 'Diagnosis of Osteoarthritis: Imaging', *Jurnal Bone Elsevier Inc* [Preprint].
- Friedrich Paulsen, J.W. (2013) *Sobotta Atlas of Human Anatomy*. 15th edn.
- Human, U.S.D. of H. and services and Administration, F. and D. (2018) 'Osteoarthritis: Structural Endpoints for the Development of Drugs, Devices, and Biological Products for Treatment Guidance for Industry'.
- Lampignano, J. P., & Kendrick, L.E. (2018) 'Bontrager's Textbook of Radiographic Positioning and Related Anatomy(9th ed.)', *Elsevier Mosby* [Preprint].
- Mulyana, D. (2018) *Metodologi Penelitian Kualitatif*. Bandung: PT. Remaja Rosdakarya.
- Pearce. E. C (2013) *Anatomi dan Fisiologi untuk paramedis*. 33rd edn. Jakarta: PT Gramedia Pustaka Umum.
- Philip W. Ballinger, E. D. Frank, V.M. (2007) *Merrill's atlas of radiographic positions & radiologic procedures*.
- Price, S.A., dan Wilson, L.M. (2006) *Pathofisiologi Konsep Klinik Proses-Proses Penyakit*. Jakarta: EGC.
- Satori, Djam'an & Komariah, A. (2017) *Metodologi Penelitian Kualitatif*. 1st edn. Bandung: Alfabeta.
- Utami, L.R.W., Prayoga, A.N. and Rosidah, S. (2024) 'Edukasi Kesehatan Pada Pemeriksaan Radiologi: Perspektif Pemeriksaan Radiografi Genu Dan Mammography Di Desa Tegorejo, Pegandon, Kendal, Provinsi Jawa Tengah', *MENGABDI: Jurnal Hasil Kegiatan Bersama Masyarakat*, 2(1), pp. 103–109. Available at: <https://journal.arei.or.id/index.php/MENGABDI/article/view/374>.
- WHO (2023) 'Osteoarthritis', *World Health Organization Departemen of* (2023) [Preprint].