Profesional article

BASIC PRINCIPLES OF THE MASTOID TEMPORAL BONE RADIOGRAPHY

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This paper shows the possibilities and advantages of certain methods of temporal bone radiography in diagnosing pathologic conditions and diseases of temporal bones, with description of basic techniques of radiological examinations: the radiography of the mastoids by Schűller, the radiography of the mastoids by Schűller using an orthogonal central beam, tangentional radiography of the mastoids (Hickey), modified tangentional radiography of the mastoids, radiography of both mastoids with a single exposition. The proper procedure is to make radiographs of both sides, i.e. both mastoids for comparison. Conclusion: the standard radiography of the mastoid temporal bones consists of these methods. *Acta Medica Medianae 2007;46(4):52-54.*

***Key word**: radiological, mastoid temporal bone*

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Our paper

Certain parts of the temporal bones can be radiologically viewed in several ways, so it is necessary to change the position of the patient's head during certain radiographic techniques (1-3). Radiologic examinations of the mastoids and of the petrous pyramids are conducted separately. The proper procedure is to make radiographs of both sides, i.e. both mastoids for comparison.

This paper is based on many years of material gathering and literary works of the authors and its aim is to present the basics of the temporal bone radiography.

The results presented in this paper show possibilities and advantages of certain methods of temporal bone radiography in diagnosing pathologic conditions and diseases of temporal bones, with description of basic techniques of radiological examinations:

The radiography of the mastoids by Schűller is commonly used. A patient is in a prone position (4-6). Any items, that could impair the interpretation of the radiograph with their shadows, should be removed from the patient's head. The Schuller view is a lateral view of the mastoid, obtained with the sagittal plane of the skull parallel to the film and with 25° to 35º-cephalocaudal angulation on the x-ray beam. The beam enters about 5 cm above the external porus acusticus, exits at the opposite porus acusticus and hits the middle of the x-ray film. For the radiography of the mastoids by Schűller, a 13x18 cm or 18x24 cm film is commonly used. One half of the film is used for one mastoid and the second half of the film is used for the other mastoid. It is mandatory to mark which mastoid is being radiographed. The patient's body should be protected from the harmful ionizing radiation by a lead shield. During the procedure, the patient is not allowed to swallow or breathe. Technically correct radiograph of the mastoids by Schűller shows the projection of the bone canal with shadows of the external and internal porus acusticus, which are visualized like two symmetrical concentric circles. It also shows the degree and extent of mastoid pneumatization, mastoid antrum, external porus acusticus and tegmen tympani.

The radiography of the mastoids by Schűller using an orthogonal central beam is a modified technique of the radiography of the mastoids by Schűller. A patient is in a prone position. The patient's head rests on a wedge-shaped surface at a 15° angle. The base of the wedge is cranially oriented. Only under these circumstances can the mastoids be radiographed using an orthogonal central beam. The orthogonal central beam enters about 5 cm above the external porus acusticus and exits at the opposite porus acusticus which is being radiographed. Everything else stays the same as the standard radiography of the mastoids by Schűller (1, 6-10).

Tangentional radiography of the mastoids (Hickey). A patient lies on his back. The sagittal plane of the skull is at a 90° angle to the table. Arms of the patient are next to his body. Any items, that could impair the interpretation of the

radiograph with their shadows, should be removed from the patient's head. The patient's head rests on a wedge-shaped surface at a 15° to 25° angle. The base of the wedge is cranially oriented. The frontal plane of the patient's head should be parallel to the film and the chin moved towards the chest. From that position, the patient's head is rotated for 35° away from the side being radiographed, while the chin stays close to the chest. In that position, the mastoid processus is shown without the superposition with other bony structures. For the radiography of the mastoids, a 13x18 cm or 18x24 cm film is commonly used. One half of the film is used for one mastoid and the second half of the film is used for the other mastoid. It is mandatory to mark which mastoid is being radiographed. If the radiography of the mastoids is being done with a grid, then a Lisholm grid is used. The patient's body should be protected from the harmful ionizing radiation by a lead shield. During the procedure, the patient is not allowed to swallow or breathe. Technically correct radiograph of the mastoids by Hickey flawlessly shows the mastoid with its cells.

Modified tangentional radiography of the mastoids. If a patient can not lie on his back for whatever reason (trauma etc.), than a modified tangentional radiography of the mastoids is performed. A patient is in a prone position with his hands next to his body. The patient's head rests on a wedge-shaped surface. The base of the wedge is cranially oriented. The patient's head is rotated for 35° towards the side being radiographed, i.e. the mastoid closer to the film is being radiographed. The central beam passes about 2,5cm posterior to the external porus acusticus of the side being radiographed and falls vertically on the film. Technically correct radiograph of the mastoids shows the mastoid with its cells.

Radiography of both mastoids with a single exposition. This technique of the mastoid radiography is rarely used. This technique shows both mastoids on a radiograph using a single exposition. A patient lies on his back. Any items, that could impair the interpretation of the radiograph with their shadows, should be removed from the patient's head and the patient's body should be protected from the ionizing radiation by a lead apron. The central beam is angulated 30° to 40° caudally, enters at the edge of the hairy portion of the head along the medial line and exits through the great occipital foramen. The radiograph shows both mastoids, apexes of the pyramids, great occipital foramen, dorsum sellae and occipital bone. Besides discovering pathological changes, radiography of the mastoid shows the type and scope of cell development, size and position of the sigmoid sinuses, presence or absence of veins. They will be the guides during the surgical pus drainage and serve as a constant proof of disease (11). The knowledge of the basis of temporal bone radiography is of exquisite importance as it offers and provides the quality temporal bone radiography (12).

Conclusion

The knowledge of basic temporal bone radiography is of exceptional importance, with the purpose of getting precise view of the temporal bone (mastoids and pyramids). Excellent coordination between otorhynolaryngologists, radiologists, as well as doctors of other specializations (surgeons, ophthalmologists etc.) is required in order to take full advantage of precious information, offered by high quality temporal bone radiographs. The proper procedure is to make radiographs of both sides, i.e. both mastoids for comparison. These radiography techniques are in everyday routine use and they will remain in use, also with modern digital x-ray machines. Using modern digital x-ray machines requires the knowledge and practical application of basic temporal bone radiography, because it remains constant, which is not the case with machines which are constantly being perfected. In that way, the radiographic image does not change in the anatomic sense, but its quality is improved and also the patients are exposed to minimal doses of radiation.

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OSNOVI RENDGENOGRAFISANJA MASTOIDNOG NASTAVKA TEMPORALNE KOSTI

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U radu se prikazuju mogućnosti i prednosti pojedinih tehnika rendgenografisanja mastoidnog nastavka temporalne kosti pri dijagnostici patoloških stanja i oboljenja temporalne kosti, uz prikaz osnove rendgenografisanja pojedinih tehnika pregleda: rendgenografija mastoida po Scüller-u, rendgenografija mastoida po Scüller-u sa ortogonalnim centralnim zrakom, tangencionalna rendgenografija mastoida (rendgenografija mastoidnog nastavaka po Hickey-u), modifikovana tangencionalna rendgenografija mastoidnog nastavaka, rendgenografija oba mastoidna nastavka sa jednom ekspozicijom. Treba rendgenografisati i jednu i drugu stranu, tj. i jedan i drugi mastoidni nastavak temporalnih kostiju, radi komparacije. Autori zaključuju da ove metode pregleda čine standardnu rendgenografiju mastoidnog nastavka temporalne kosti. *Acta Medica Medianae 2007;46(4):52-54.*

Ključne reči: *radiologija, mastoid temporalne kosti*