

Analysis of a Panoramic Radiograph

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Authored by:

Dr. Mindy Cash

Authored by:

Dr. Susanne Perschbacher



 Dr. Susanne
Perschbacher

Background

Panoramic radiographs are common extraoral images used in dentistry which capture the entire maxillofacial region on a single image. They are difficult to interpret because they encompass such a large area of anatomy with numerous superimpositions of the hard and soft tissue structures of the region. This introduction to the systematic analysis of a panoramic image does not teach the radiologic interpretation of all possible findings that may be detected, but rather introduces the student to an approach to examining the image and identifying the important anatomy in a methodical and comprehensive manner.

The interpretation of a panoramic image follows the same principles as with any other image or image series. A systematic and repeated process is used to ensure that all significant findings are identified. First, the osseous structures and surrounding soft tissues are assessed. Second, the alveolar processes are examined. Finally, the teeth are evaluated.

Procedure

1. Osseous structures and surrounding soft tissues

Compared to a series of intraoral images, the panoramic image depicts a much larger area of anatomic structures of the oral and maxillofacial region. Therefore, much more time will be spent doing this part of the interpretation. It is critical to have a good understanding of the normal anatomy in order to identify the presence of any abnormalities. It is useful to compare the left and right sides of the image when deciding if a finding is normal, since structures appearing bilaterally are generally anatomic. Comparing the left and right sides should also be done in order to detect any asymmetries that may be indicative of pathosis or a developmental condition.

Begin by assessing the periphery and corners of the image. This is a good habit because often observers are too occupied with looking at the center of the image, zoning in on the teeth and jaws, thus neglecting the outer edges of the film. In these areas, the following structures, when visible, are assessed:

- The orbits.
- The skull base, including the articular process of the temporal bone.
- The contents of the neck, including the cervical spine, styloid processes, pharynx, submandibular glands and hyoid bone.

Next, examine the outer cortices of the mandible. Abnormalities could include discontinuities or missing structures. Begin at the base of the anterior surface of the ramus on the right side and trace up and around the right coronoid process, down the coronoid notch and around the condylar head. Examine the posterior border of the right side of the mandible, around the angle and along the inferior border to the left side. Continue around the angle of the left side of the mandible, up the posterior border, around the condyle, coronoid notch and coronoid process and down the anterior border of the ramus on that side.

Now move to the maxilla and examine its cortices. Begin at the most superior aspect of the posterior wall of the right maxillary sinus and assess this cortex as well as its floor and medial walls. Repeat this process for the left side. When examining the posterior border of the sinus, it is important to also identify the zygomatic process of the maxilla and the pterygomaxillary fissure. These structures produce thin radiopaque lines that run roughly parallel to the posterior wall of the maxillary sinus, and may be confused with it. Follow the left and right zygomatic bones and arches as they extend posteriorly from the zygomatic processes to the temporal bones. Finally, look at the internal density of the sinuses, comparing the left and right sides.

Assess the structures of nasal cavity including the floor and concha, which extend horizontally along both sides of the image, and the nasal septum. Note the soft palate, imaged bilaterally as it extends off the posterior aspect of the hard palate, into the oropharynx.

Now examine the bone pattern of the maxilla and mandible. Assess the density and pattern of trabeculae for any abnormalities. Comparing left and right sides is useful, but keep in mind that some conditions may present with a generalized alteration in bone pattern. In the mandible, look at the left and right inferior alveolar nerve canals and the mandibular and mental foramina. Examine their size, position, cortication and symmetry.

Next, the alveolar processes and teeth are evaluated. The spatial resolution of a panoramic image is much lower than intraoral radiographs, making assessment of the alveolar processes and teeth more difficult. Nonetheless, any visible positive findings must be identified. These structures should be viewed in a systematic manner, examining the posterior of the first quadrant to the posterior of the fourth quadrant in a clockwise direction around the arches. This sequence is followed for each possible finding.

2. Alveolar processes

Begin examining the alveolar processes by assessing the crestal bone position and identifying any periodontal bone loss, including horizontal, vertical and furcation defects. Next, look for signs of inflammatory diseases such as rarefying and sclerosing osteitis. Examine the periodontal ligament spaces and lamina duras for anything affecting their continuity.

3. Teeth

The features related to teeth that must be reported are discussed in more detail in other resources. However, be reminded to identify any visible caries, inadequate restorations, calculus and any eruptive, developmental and acquired abnormalities.