

## IMAGING MODALITIES AND ALGORITHM IN CASES OF MANDIBULAR TRAUMA

Hristina Mihailova

*Department of imaging and oral diagnostic*

*Faculty of Dental Medicine, Medical University – Sofia, Bulgaria*

### ABSTRACT:

There are a lot of reports in the literature concerning a wide variety of imaging modalities used for the diagnostic process of mandibular fractures. They include plain radiography, CT, MRI, radionuclide imaging. Because all of these examinations cannot be used simultaneously imaging algorithms should be developed. That will allow early diagnosis of the mandibular fracture to be made.

This issue focus on which imaging modalities to use and when to use them in the diagnostic process of mandibular trauma.

**Key words:** mandibular fracture, radiograms, algorithm

It is well-known that investigations in early detection and management of mandible injuries are very important.

The literature data of comparative studies of imaging modalities in cases of mandibular trauma show that diagnose “mandibular fracture” is made mainly by means of plain film radiography /4,5/.

Few emergency rooms have a panoramic dental radiography so these radiographs are rarely used.

It is known that computed tomography /CT/ is a high suitable method for examining fractures of the mandibular condylar process/2,4,5/.

It is known that magnetic resonance imaging/MRI/ is used in cases of suspected condylar chondral fracture only.

Actually in the literature of maxillo-facial trauma there are a lot of issues for investigations concerning different X-ray methods and techniques for diagnosing a mandibular fracture.

But the literature data didn't show the algorithm of X-ray examination in the Emergency rooms – when and which imaging modality to choose in order to be most precise in the diagnose “mandibular fracture” .

Here are some attempts for systemizing and standardizing some facial series for the clinical practice in the Emergency Departments

A. Pogrel and L.Kaban/1989/ found the standart the following views for mandibular fractures:

- lateral facial views
- posterior-anterior view

- occlusal radiograph
- intraoral radiograph
- panoramic X-ray
- CT- with limitations for mandibular fractures, mainly used for midface fractures

According to S. Rogers et al./1995/ in Emergency Departments in UK 3 radiographs are used. These are so called “maxillo-facial views”. Routine films comprises:  
- two occipito-mental views /typically an OM and OM – 30 /  
- lateral view

Therefore 3 films routinely are taken for facial injury assessment.

A. Pogrel at al., 2000 announce that in Emergency Departments in USA is used so called “midface series” in cases of midface trauma: there are commonly 4 radiograms in this midface series:

- the posterior-anterior view/or occasionally anterior-posterior if the patient can not lie on their front/
- a lateral facial views
- a submento-vertex view /for the zygomatic complex/
- 30 occipito-mental view or Water's view /some institutions take an occipitomenal series of radiographs consisting of 10 or 15, 30 and 45 occipitomenal views/.

N. Rabuhina at al./1999/ suggest 5 schemes for diagnostic of midface fractures; they are unclear and couldn't be used for standardization.

In most hospital emergency departments in Bulgaria the patients undergoes a series of plain radiographs whenever the possibility of mandibular fracture is suspected. It's well-known that there is considerable variation in radiological prescribing habits of doctors working in Accident and Emergency departments and too many unnecessary radiograms are requested and therefore the number of views for a routine mandibular survey varies amongst departments resp. specialists, doctors.

We standardized X-ray methods for diagnostic of isolated mandibular fractures into different projections of the mandible named “mandibulo-facial series” .

It includes the following projections and methods:

- posterior-anterior view /en face/
- oblique view of the left mandible
- oblique view of the right mandible
- occipito-mental view /typically/

If in the Emergency Department panoramic X-ray unit is available, the mandibulo-facial series include:

- posterior-anterior view /en face/
- orthopantomography
- occipito-mental view /typically/

This means : 4 films routinely taken for facial injury assessment - so called “mandibulo-facial series” - posterior-anterior view/PA/, 2 oblique /left and right/ and occipito-mental view for each patient with trauma of the mandible.

Panoramic X-ray is obligatory in cases of apparatus availability; this abolishes only oblique views /left and right/.

Occipito-mental view - obligatory for maxillo - facial trauma – this view is for screening of facial fractures; this gives a single view of the orbital floor, the zygomatic process, the maxillary sinus and the zygomatic arches and a view of the mandible, especially the coronoid process.

Intraoral radiograms /if dental unit is available/ are specifying and they are fixed depending on the localization /corpus, mentum /of the fracture line.

If there is a suspicion of a combined fracture – mandibular and midface fractures we should proceed further to CT and with MRI in cases of suspected fracture of floor of orbital cavity for estimation of the orbital soft tissues.

#### COMMENT

Having in mind that the number of views for a routine X ray mandibular survey varies amongst doctors, it is necessary a standard to be used.

That's why we suggest an algorithm of imaging

modalities for investigation of mandibular fractures named “mandibulo-facial series” . It consists of 4 planned radiograms /projections/; it is used not only for a diagnostic of mandibular fractures, but as a screening of the maxillo-facial trauma too.

Using “mandibulo-facial series” will lead to optimizing of the diagnostic process :

- reducing the time from the clinical observation to X-ray diagnosis - - reducing the number of radiographical examinations / thus a reduction in patient radiation exposure/
- reducing the cost of X ray examination
- prevention of delaying of the diagnostic process

Using “mandibulo-facial series” / with 4 films routinely/ will be not only for diagnostic of mandibular fracture, but a screening for each facial fractures too.

Using this series of 4 plain radiographs for mandibular fracture diagnostic in the emergency room is considerably more cost-effective, time effective and effective in reducing radiation exposure.

All these radiograms need to be done in order to indicate whether one should proceed further to CT scanning or whether there are no other fractures and no further imaging is necessary.

#### CONCLUSION

A routine, standardizes, so called “mandibulo-facial series” consists of 4 plain films /a posterior-anterior view, two oblique facial views of the mandible and occipitomenal view typically/ represent the algorithm of imaging modalities in cases of mandibular trauma that we suggest.

---

#### REFERENCES:

1. Рабухина Н.А., П. Аржанцев. Рентгенодиагностика в стоматологии, М., 1999
2. Holmgren, E.P. Facial fracture characteristics and facial CT utilization in trauma patients. AOMS - Oral abstract session 3; Trauma 34. 2002
3. Pogrel M. A., Sc. Podlesh. K. Goldman. Efficacy of a single occipito-mental radiograph to screen for midfacial fractures. J. Oral Maxillofac. Surg., 2000; 58; 24-26
4. Pogrel M.A., Kaban L.B. Mandibular fracture in: Facial fractures; Habana-Ariyan; B. C. Decker inc. Toronto-Philadelphia, 1989; 183-229
5. Raustia A., J. Ryhtinen., KS. Oikarinen, M. Altonen. Conventional radiographic and computed tomographic findings in cases of fracture of the mandibular condylar process. J. Oral Maxillofac. Surg., 1990; 48; 1258-1262
6. Rogers S. N., S. Bradley, S. P. Michael. The diagnostic yield of only one occipito-mental radiograph in cases of suspected midfacial trauma - is one enough? Br. J. Oral Maxillofac. Surg., 1995; 33; 90-92

#### Address for correspondence:

Dr Hristina Mihailova

Faculty of Dental Medicine, Department of Imaging and oral diagnostic

1, G. Sofiiski str., 1431 Sofia, Bulgaria

E-mail: eli\_hrishi@abv.bg (12 may 2008)