Correlation of Multislice CT and Biopsy in Diagnosis of Jaw Swelling

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Abstract

Background: Radiography appears to be a promising way of investigating jaw lesions. Multi-detector CT (MDCT) scan, due to its sensitivity and diagnostic performance, is widely performed for different types of maxilla and mandible swellings. **Objectives:** To evaluate the role of multislice CT in diagnosis of jaw swelling using different software programs available.

Objectives: To assess the task of multislice CT diagnosis in jaw lesions with various software programs.

Patients and methods: A prospective cohort study included 50 patients with jaw swelling had been examined by multislice CT Radio-diagnosis Department, Sohag University.

Results: There were non-statistical significant differences between MDCT and biopsy as regard diagnosis of mandibular swelling, 82% of diagnosis by MDCT had the same diagnosis by biopsy

Conclusion: MDCT has a key role in giving an appropriate diagnosis, rating it and then directing care decisions being far superior to traditional radiography of mandible

Keywords : Multislice CT; Jaw Swelling; Mandibular lesions.

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Introduction

Radiography appears to be a promising way of investigating jaw lesions. Intraoral imaging has a clear image of the teeth and bone of the affected tissue, but due to the limited film scale they can be not required with lesions greater than 3 cm. For examining bigger lesions and seeing the skull and face structure, extraoral radiographs are used. Panoramic x-ray is a special method which involve a wide area of small dose radiation that could be used in patients who cannot open their mouths **(Neyaz et al., 2008)**.

Jaw swellings on radiology are impossible to differentiate between them. The history of the case and radiology can reduce the difference diagnosis. Any jaw swellings should be assessed with the appropriate radiological characteristics in mind **(Saavedra-Abril et al., 2010)**.

Multi-detector CT (MDCT) scan, due to its sensitivity and diagnostic performance, is widely performed for different types of maxilla and mandible swellings. MDCT-scan allows you to acquire multiple thin axial pictures quickly and more accurately. MDCT scan offers precise data on the height, width and three-dimensional (3D) maxilla and mandible assessment, and details of where typical anatomical features are located such as the mandibular canal, mental foramen, forame, foramen and incisive foramen **(Abrahams, 2001)**. The aim of this research is to assess the task of multislice CT diagnosis in jaw lesions with various software programmes.

Patients and methods

A prospective cohort study involved 50 subjects with jaw swelling had been examined by multislice CT Radiodiagnosis Department, Sohag University.

All participants had prior informed approval and the research procedure approved by the Institutional Research and Medical Ethics Committees of Sohag University.

Nontraumatic clinically suspected mandibular lesions, referral patients for CT Scan because of unclear diagnosis in dents, and patients with OPG or X rays have been included in the study. Mandible trauma and metal prothesis patients were excluded.

Methods

All participants subjected to full history, examination and CT mandible and biopsy .

CT mandible technique:

All participants received a General Electric Light Speed Ultra CT01-OCO CT scan (8 slice). Axial cut with a thickness of 1,25 mm was performed on each patient and sagittal and coronal frames were then multiplanar reformatted.

Statistical analysis

Patients' data were presented as frequency and percentage for categorical variables, mean and SD for numerical variables. Groups were compared by independent samples Student t-test and $\chi 2$-test for numerical and categorical data, respectively. All data and statistical analyses were handled by statistical package for the social sciences (SPSS, IBM, SPSS Inc. Chicago, USA) computer package version 18.

Results

Our result involved 50 patients with jaw swelling where there were 50% of cases had painful swelling, 8% had painless swelling, and 4% with numbness, 6% had delayed extraction wound healing, 4% had facial deformity, and 8% were not described lesions (**Table.1**).

Distribution of diagnosed pathology by multislice CT revealed that 40% of cases had Ameloblastoma, 16% had Keratocystic odontogenic tumor (KCOT), 12% had Periapical cyst, 8% had Odontoma, 4% were Dentigerous cyst, 6% Osteomyelitis, 2% had Cementoblastoma, 2% with Fibrous Dysplasia, 2% were Arteriovenous Malformation, 2% of swelling were

Osteogenic Sarcoma, and 2% were Osteochondroma (**Table. 2**).

Multicystic Ameloblastoma is the most common type accounted in our study. On CT most common appearance was of multiloculated lytic lesion with cortical erosions, in our study, cases with Keratocysticodontogenic tumor (KTOC); 75% were of multiloculated lytic lesion with cortical erosion, and 25% were Cyst with cortical expansion and erosions. There was 6 cases with periapical cyst, presented by Cyst with sclerotic margins in 66.7%, and Lytic-Sclerotic lesion with soft tissue swelling in 33.3%, the all 4 case of Odontoma had Opaque lesion with lucent rim. Also, there was one case with Cementoblastoma was appeared by Well circumscribed radio-opaque mass associated with root of tooth, the case with Fibrous Dysplasia appeared with Lesion with ground glass density and expansion. One case with arteriovenous Malformation which presented by Multiloculated cystic lesion with intense post contrast enhancement, the one case of osteogenic Sarcoma was presented with aggressive destruction of bone with periosteal reaction and soft tissue mass, finally, the case with osteochondroma was appeared by Bony outgrowth with area of sclerosis (**Table.3**).

There were non-statistical significant differences between MDCT and biopsy as regard diagnosis of mandibular swelling, 82% of diagnosis by MDCT had the same diagnosis by biopsy (**Table.4**).

Table 1. Distribution of patients according to complaint or clinical feature

Variables	Cases (n = 50)	
	NO	**%**
Swelling		
▪ Painful	25	50%
▪ Painless	4	8%
▪ With numbness	2	4%
Mass	4	8%
Pain	6	12%
Delayed extraction wound healing	3	6%
Facial deformity	2	4%
Not described	4	8%

Table 2. Distribution of diagnosed pathology by multislice CT

Variables	Cases (n = 50)	
	NO	**%**
Ameloblastoma	20	40%
Keratocystic odontogenic tumor (KCOT)	8	16%
Periapical cyst	6	12%
Odontoma	4	8%
Dentigerous cyst	2	4%
Osteomyelitis	3	6%
Cementoblastoma	1	2%
Fibrous Dysplasia	1	2%
Arteriovenous Malformation	1	2%
Osteogenic Sarcoma	1	2%
Osteochondroma	1	2%

Table 3. Distribution of appearance of pathology by multislice CT

Variables	Cases	
	NO	%
Ameloblastoma (n=20)		
Multiloculated lytic lesion with cortical erosion	20	100%
Keratocystic odontogenic tumor (KCOT) (n=8)		
Multiloculated lytic lesion with cortical erosion	6	75%
Cyst with cortical expansion and erosions	2	25%
Periapical cyst (n=6)		
Cyst with sclerotic margins	4	66.7%
Lytic-Sclerotic lesion with soft tissue swelling	2	33.3%
Odontoma (n=4)		
Opaque lesion with lucent rim	4	100%
Dentigerous cyst (n=2)		
Expansile cyst with unerupted crown of teeth	2	100%
Osteomyelitis (n=3)		
Lytic lesion with sequestrum	2	66.7%
Lytic-Sclerotic lesion with soft tissue swelling	1	33.3%
Cementoblastoma (n=1)		
Well circumscribed radio-opaque mass associated with root of tooth	1	100%
Fibrous Dysplasia (n=1)		
Lesion with ground glass density and expansion	1	100%
Arteriovenous Malformation (n=1)		
Multiloculated cystic lesion with intense postcontrast enhancement	1	100%
Osteogenic Sarcoma (n=1)		
Aggressive destruction of bone with periosteal reaction and soft tissue mass	1	100%
Osteochondroma (n=1)		
Bony outgrowth with area of sclerosis	1	100%

Table 4. Correlation of multislice CT Diagnosis and Biopsy Diagnosis

Multislice CT Diagnosis	Diagnosis on Biopsy		$\chi 2$	P value
	Same Diagnosis No (%)	**Different Diagnosis No (%)**		
Ameloblastoma (n=20)	15 (75%)	5 (25%)	5.217	0.538
Keratocystic odontogenic tumor (KCOT) (n=8)`	7 (87.5%)	1 (12.5%)		
Periapical cyst (n=6)	5 (83.3%)	1 (16.7%)		
Odontoma (n=4)	3 (75%)	1 (25%)		
Dentigerous cyst (n=2)	2 (100%)	0 (0%)		
Osteomyelitis (n=3)	2 (66.7%)	1 (33.3%)		
Cementoblastoma (n=1)	1 (100%)	0 (0%)		
Fibrous Dysplasia (n=1)	1 (100%)	0 (0%)		
Arteriovenous Malformation (n=1)	1 (100%)	0 (0%)		
Osteogenic Sarcoma (n=1)	1 (100%)	0 (0%)		
Osteochondroma (n=1)	1 (100%)	0 (0%)		
Total (n=50)	**41 (82%)**	**9 (18%)**		

$\chi 2$: Chi-square test

Case presentations

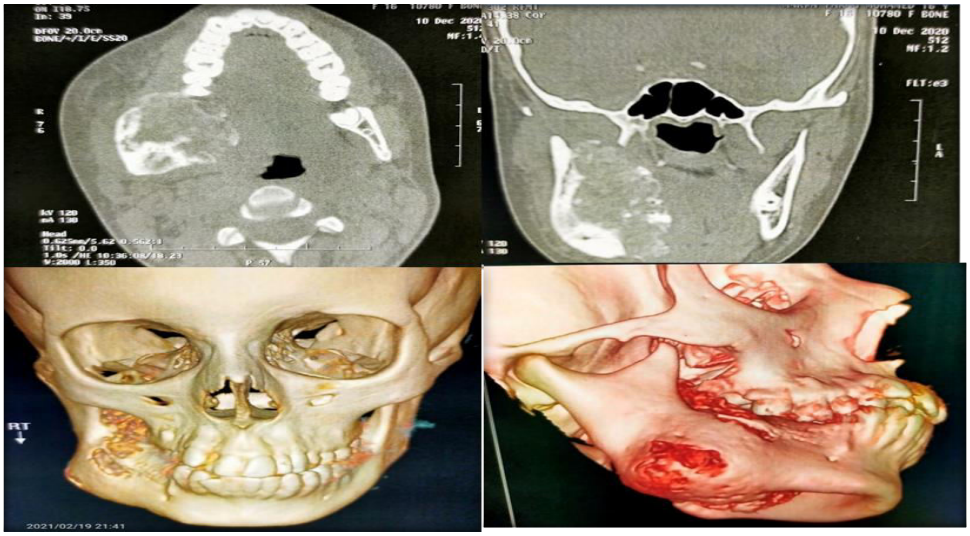

Fig.1. Case 1 (A,B) — Axial and coronal bone window revealed there is a huge lytic lesion involving the mandible, the largest of its bulk is present around the right mandibular angle, expanded mandibular cortex is partly thickened and partly invisible. This lesion has internal multilocular cystic and solid components; large amount of the internal calcification, (C,D) — 3D reconstruction images…Findings consistent with Ameloblastomas

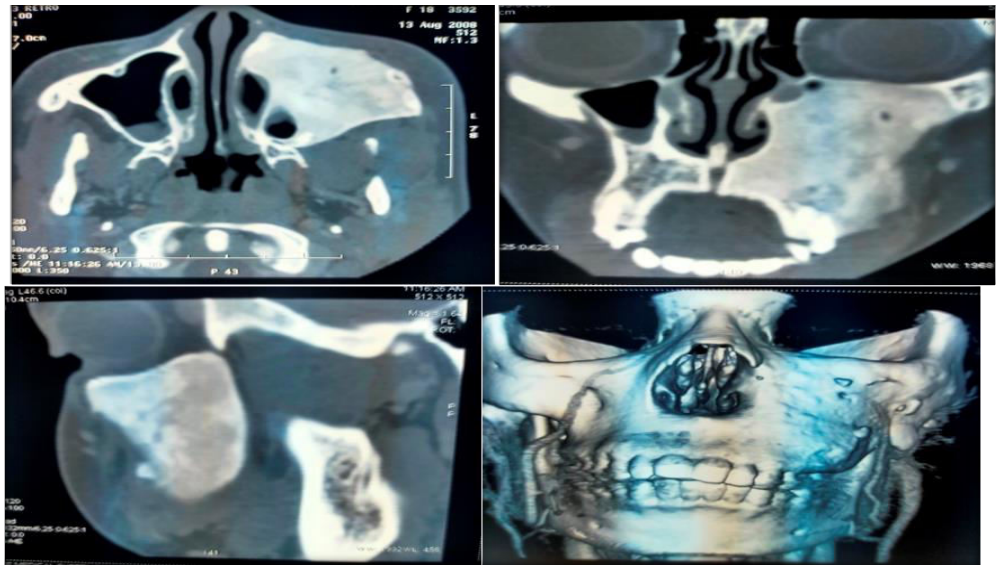

Fig.2. Case 2 (A,B) — Axial And coronal bone window images shows Ground glass attenuation lesion filing left maxillary sinus., (C,D) — sagittal and 3D reconstruction images show expansion of maxilla with extension to alveolar processes. Findings consistent with fibrous dysplasia of the left maxilla

Discussion

Mandible swellings break into a wide variety of dentogenic and nonodeontogenic defects. A similar radiological presence occurs in certain lesions. In such cases, CT scans are very useful in revealing alternative observations. Moreover, for a final diagnosis, certain pathologies need a biopsy. Imaging particularly the CT scan will reduce the difference even though you do not make the final diagnosis **(Solanki Kunal et al., 2016)**.

As regard distribution of patients according to complaint or clinical feature; there were 50% of cases had painful swelling, 8% had painless swelling, and 4% with numbness, 6% had delayed extraction wound healing, 4% had facial deformity, and 8% were not described lesions, whereas, the study of **Odai and Ogbeide, (2017)** revealed that 740 patients complain of with swelling alone, 327 complain of with swelling and pain while 245 complain of with swelling, pain and ulceration, while in **Pereira et al. (2010)**, the primary characteristics of tumors was a swelling of the affected area (n=40; 57.1%). This was statistically significant in relation to less frequent signs and symptoms such as pain (n=7; 10%), ulcers (n=1; 1.4%), dental mobility (n=4; 5.7%), root reabsorption (n=2; 2.8%) and fistula (n=1; 1.4%) (P<0.001).

In addition to above findings, distribution of diagnosed pathology by multislice CT revealed that 40% of cases had Ameloblastoma, 16% had Keratocystic odontogenic tumor (KCOT), 12% had Periapical cyst, 8% had Odontoma, 4% were Dentigerous cyst, 6% Osteomyelitis, 2% had Cementoblastoma, 2% with Fibrous Dysplasia, 2% were Arteriovenous Malformation, 2% of swelling were Osteogenic Sarcoma, and 2% were Osteochondroma.

In accordance to our findings, the study of **Solanki Kunal et al. (2016)** reported that the most common pathology was Ameloblastoma (24.28%), followed by Keratocysticodontogenic tumor (KTOC) (20%).

The degree of lesion, extension at all 3 planes, and boundaries of these benign lesions can be seen by MDCT scans. The expanding lesion

and water density was seen in a dentigerous cyst inside a cyst with no extraosseous lesion. Amaloblastoma is seen in low-density cystic regions with few areas of isodensity reflecting soft tissue in a CT picture. An erosion of the cortical plate or tooth root can demonstrate the aggressive behavior of the lesion. The improved soft tissue in the lesion is depicted in the contrast **(Dunfee et al., 2006)**.

In the study on our hands, Multicystic Ameloblastoma is the most common type accounted in our study. On CT most common appearance was of multiloculated lytic lesion with cortical erosions, in our study, cases with Keratocysticodontogenic tumor (KTOC); 75% were of multiloculated lytic lesion with cortical erosion, and 25% were Cyst with cortical expansion and erosions, The periapical (radicular) cyst is the most common odontogenic cyst **(Dunfee et al., 2006)**. In our study there was 6 cases with periapical cyst, presented by Cyst with sclerotic margins in 66.7%, and Lytic-Sclerotic lesion with soft tissue swelling in 33.3%, the all 4 case of Odontoma had Opaque lesion with lucent rim.

In our study, there was one case with Cementoblastoma was appeared by Well circumscribed radio-opaque mass associated with root of tooth, the case with Fibrous Dysplasia appeared with Lesion with ground glass density and expansion, In a study by **Avril et al. (2014)**,100% lesions of fibrous dysplasia showed ground glass bone density, in our study, there one case with arteriovenous Malformation which presented by Multiloculated cystic lesion with intense post contrast enhancement, the one case of osteogenic Sarcoma was presented with aggressive destruction of bone with periosteal reaction and soft tissue mass, finally, the case with osteochondroma was appeared by Bony outgrowth with area of sclerosis.

Moreover, in the present study, there were non-statistical significant differences between MDCT and biopsy as regard diagnosis of mandibular swelling, 82% of diagnosis by MDCT had the same diagnosis by biopsy.

In **Odai and Ogbeide, (2017)** study, in 61 patients MDCT scan was accurate for diagnosis as preoperative findings and biopsy report. In 9 patients likely diagnosis given on CT scan was not associated with postoperative biopsy diagnosis. In 25 patients OPG or conventional radiographs were not enough for lesion features but CT scan reported features and extent of lesion. In 9 patients OPG showed single lesion while CT showed multiple lesions, P value is 0.72, so it can be stated that MDCT diagnosis matched with Biopsy results.

Conclusion

MDCT has a key role in giving an appropriate diagnosis, rating it and then directing care decisions being far superior to traditional radiography of mandible in all aspects but the cost and where metal prosthesis caused artefacts.

Conflict of Interests

The authors reported no conflict of interest.

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