APPROACHES OF DENTOMAXILLOFACIAL AND MEDICAL RADIOLGISTS ABOUT REPORTING

Dentomaxillofasiyal ve Medikal Radyologların Raporlamayla İlgili Uygulamaları

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ABSTRACT

Objectives: Radiological reporting is a relatively new and challenging issue in dentomaxillofacial radiology, whereas it has been performed so many years in medical radiology. The purpose of this study is to compare approaches of dentomaxillofacial and medical radiologists regarding radiology reporting.

Materials and Methods: Dentomaxillofacial and medical radiologists were invited by e-mail. The participants filled a survey regarding the features of their own radiology reports. The study was based on two independent groups (dentomaxillofacial and medical radiologists). Mann-Whitney U test was used for two independent groups.

Results: 285 radiologists in total (115 dentomaxillofacial and 170 medical radiologists) participated in this survey. Structured radiologic reports were mostly preferred by both dentomaxillofacial (53.9%) and medical radiologists (77%), but statistically significant difference was found between two groups (p<0.05). Although dentomaxillofacial (79.1%) and medical (81.2%) radiologists mostly reported that their own reports consisted of separate headings as clinical information, findings and conclusion, there was a statistically significant difference between two groups (p<0.05). The majority of dentomaxillofacial (99.1%) and medical (99.4%) radiologists agreed regarding radiology training programs should include radiology report construction.

Conclusion: This is the first study pointing out the approaches of dentomaxillofacial radiologists about reporting. Good radiological reporting is a relatively new task for dentomaxillofacial radiologists compared to medical radiologists. This study showed that the approaches of dentomaxillofacial and medical radiologists were similar regarding radiological reports.

Key words: Medical Education, Radiology, Dentistry, Medicine, Survey

Öz. 
Amaç: Radyolojik raporlama dentomaksillofasiyal radyoloji için görece yeni ve ilgi çekici bir konudur, oysa medikal radyolojide uzun yıllardan beri yapılmaktadır. Bu çalışmanın amacı, dentomaksillofasiyal ve medikal radyologların radyolojik raporlama ile ilgili uygulamalarını karşılaştırmaktır.


Sonuç: Bu çalışma dentomaksillofasiyal radyologların raporlama uygulamalarıyla ilgili ilk çalışmadır. İyi radyolojik raporlama yapmak dentomaksillofasiyal radyologlar için görece olarak yeni bir görevdir. Bu çalışmamız dentomaksillofasiyal ve medikal radyologların radyolojik raporlama ile ilgili uygulamalarını benzer olduğunu gösterdi.

Anahtar kelimeler: Tip Eğitimi, Radyoloji, Diş Hekimliği, Tip, Anket

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INTRODUCTION

A radiological report summarizing the radiologic examination is a patient’s permanent medical record and it is the most important communication. The appropriate construction and clarity of the radiological report are essential for high quality patient care as well as the requirement of clinical focus. Additionally, the radiological report contains prediagnosis and/or diagnosis, a suitably ordered differential diagnosis and, sometimes suggestions for further evaluation. The radiological report also reflects the radiologist’s knowledge, skill and training levels. It can provide multifaceted information about the patient’s experience in the radiology department and finalizes with the imaging observations, conclusions, and recommendations. Communicating the results of imaging procedure to the referring physician and the patient is the primary goal of the radiology report.

The ideal format for the radiology report has not been found and there is no generally accepted format. The presence of wide variety style in reporting may explain this situation. The radiologists have used two basic forms as traditional free-text and structured reports. Traditional free-text radiology report is dictated in narrative style, any order and format chosen by radiologist. This type of radiology report is mostly non-standardized, deficient, uncertain and error prone. In recent years, structured reports have replaced traditional free-text radiology reports. Structured reporting means the use of predefined formats and terms to create reports; in this sense, structured reports are based on templates or checklists. Radiology report is not only an important communication tool among radiologist and referring clinician, but also a legally binding document. Structured radiology reports include several advantages such as clarity, time-efficiency, automated billing and order entry, presence of technical parameters, measurements, annotations, reduction of ambiguity. Hence, recently, structured radiology reports are preferred by many radiologists and clinicians. Various authors agree regarding many benefits of structured reporting.

Recently, the radiological reports are prepared by both medical and dentomaxillofacial radiologists. In dentomaxillofacial radiology, extraoral and intraoral radiographic examinations and especially cone-beam computed tomography (CBCT) images are reported in routine clinical dental practice. Radiology reporting is a relatively new and challenging issue in dentomaxillofacial radiology, whereas radiology reporting has been performed so many years in medical radiology. With the increasing use of CBCT, various necessities have emerged about radiology reporting in dentomaxillofacial radiology. The approaches of medical radiologists about the reporting are generally well-known. According to best of our knowledge, there is no study about approaches of dentomaxillofacial radiologists.

The purpose of this study was to compare approaches of dentomaxillofacial radiologists and medical radiologists regarding radiology reporting.

MATERIALS AND METHODS

The study was approved by Gazi University Institutional Review Board (decision number, 77082166/604, 01/02).

The radiologists were invited by e-mail in two separate links via surveey.com, a web-based survey tool for dentomaxillofacial radiologists and medical radiologists to participate the study. Before invitation of the individuals, The Boards of National Oral Diagnosis and Maxillofacial Radiology and Turkish Radiology Society were asked for permissions and their approvals were obtained. The survey contained 15 questions (Appendix).
All participants both radiologists and residents were considered as radiologists in this study. Responders were asked to enter demographic data and the questions about their radiology reports now.

Statistical analysis was performed by using SPSS software, 23.0 version (SPSS Inc., Chicago, USA). Frequency tables were prepared for all questions and answers. The study was based on basically two independent groups as dentomaxillofacial radiologists and medical radiologists. Mann-Whitney U test was used for two independent groups. P values of 0.05 were considered to indicate a statistically significant difference.

RESULTS

In total 285 radiologists (115 dentomaxillofacial and 170 medical radiologists) participated in this survey. The features of the participants including age, gender, academic degrees, relevant institution and examination methods are shown in Table 1. The majority of dentomaxillofacial radiologists was female (64.3%) and most medical radiologists was male (62.9%).

Table 1. Distribution of demographic information, academic degrees, relevant institution and examination methods of the participants

<table>
<thead>
<tr>
<th>Items</th>
<th>Dentomaxillofacial Radiologists (%; n)</th>
<th>Medical Radiologists (%; n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female 64.3%; 144</td>
<td>Male 35.7%; 81</td>
</tr>
<tr>
<td>Mean age and age range</td>
<td>38.3%; 44</td>
<td>27.6%; 47</td>
</tr>
<tr>
<td>Academic degrees</td>
<td>Resident 42.6%; 95</td>
<td>Assistant professor 15.6%; 32</td>
</tr>
<tr>
<td></td>
<td>Associate professor 4.1%; 9</td>
<td>Lecturer 28.2%; 58</td>
</tr>
<tr>
<td>Relevant institution</td>
<td>Oral and Dental Health Center 3.4%; 7</td>
<td>Dental Health Center 26.9%; 56</td>
</tr>
<tr>
<td></td>
<td>Community hospital 28.8%; 60</td>
<td>Private sector 1.7%; 3</td>
</tr>
<tr>
<td>Methods of examination</td>
<td>Panoramic radiograph 18</td>
<td>Panoramic radiograph 18</td>
</tr>
<tr>
<td></td>
<td>Cone-beam computed tomography 56</td>
<td>Cone-beam computed tomography 56</td>
</tr>
<tr>
<td></td>
<td>Others 18</td>
<td>Others 18</td>
</tr>
<tr>
<td></td>
<td>Magnetic resonance imaging -</td>
<td>Magnetic resonance imaging -</td>
</tr>
<tr>
<td></td>
<td>Conventional methods 1.2%; 24</td>
<td>Conventional methods 1.2%; 24</td>
</tr>
</tbody>
</table>

The participation of residents (39.1%) was more common in dentomaxillofacial radiologists and specialists (39.4%) were higher than the others for medical radiologists. The participants for both dentomaxillofacial (91.3%) and medical radiologists (50%) mostly worked in universities. The most common examination methods were CBCT and computed tomography for dentomaxillofacial and medical radiologists, respectively (Table 1). Regarding working time in radiology department and reporting time, the majority of both dentomaxillofacial (42.6%) and medical radiologists (31.8%) were 1-5 years (Table 2).

Table 2. The distribution of participants for working time in radiology department and their reporting time

<table>
<thead>
<tr>
<th>Items</th>
<th>Dentomaxillofacial Radiologists (%; n)</th>
<th>Medical Radiologists (%; n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working time in radiology department</td>
<td>Less than 6 months 13.2%; 30</td>
<td>6-12 months 9.3%; 20</td>
</tr>
<tr>
<td></td>
<td>6-12 months 13.2%; 30</td>
<td>More than 12 months 2.9%; 6</td>
</tr>
<tr>
<td>Reporting time</td>
<td>Less than 6 months 13.2%; 30</td>
<td>6-12 months 9.3%; 20</td>
</tr>
<tr>
<td></td>
<td>6-12 months 13.2%; 30</td>
<td>More than 12 months 2.9%; 6</td>
</tr>
</tbody>
</table>

Regarding the sources for writing a good radiology report of the participants during their training (question 6), the majority of dentomaxillofacial radiologists (43.5%) reported as teaching staff and medical radiologists reported as more senior trainees (77.6%). There was a statistically significant difference between two groups (p<0.05; Table 3). Regarding the format of radiology report construction, the majority of dentomaxillofacial radiologists and medical radiologists stated that they used the structured report, 53.9% and 77%, respectively (question 7). A statistically significant difference was found between two groups (p<0.05; Table 3). Regarding the use of language in radiology report, the majority of dentomaxillofacial radiologists (60.9%) and medical radiologists (84.1%) noticed using common words with clinicians (question 15). There was a statistically significant difference between two groups (p<0.05; Table 3).

The majority of dentomaxillofacial and medical radiologists reported that patients mostly wanted verbal information about their own findings after examination (question 8). Statistically significant difference was found between two groups (p<0.05; Table 3).
Regarding clinical information, findings and the conclusion of the report put into separate paragraphs, most of all participants agreed (question 9). No statistically significant difference was found between two groups (p>0.05; Table 4). The participants mostly reported that their radiology reports ended with a conclusion, included technical details and radiology training programs should include radiology report construction (question 12, 13 and 14). No statistically significant difference was found between two groups (p>0.05; Table 4).

Table 4. The comparison between preferences of dentomaxillofacial and medical radiologists about reporting

<table>
<thead>
<tr>
<th>Variables</th>
<th>Dentomaxillofacial Radiologists</th>
<th>Medical Radiologists</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use free text format</td>
<td>99.1%; 114</td>
<td>0.9%; 1</td>
<td>99.4%; 169</td>
</tr>
<tr>
<td>Use structured format</td>
<td>33%; 38</td>
<td>67%; 99</td>
<td>0.008*</td>
</tr>
<tr>
<td>Use opinion of the attending radiologist</td>
<td>77%; 131</td>
<td>23%; 42</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

*Difference is statistically significant

However, these studies have focused on the states and practices of medical radiologists. According to best of our knowledge, this is the first investigation about approaches of dentomaxillofacial radiologists and comparison with medical radiologists.

The radiology residents must learn multiple facets of radiology practice, especially the construction of radiology reports during their training. However, most of the time there is no specific lecture related with radiology report in the training period. Sistrom et al. stated that radiology residents received no more than one hour of didactic instruction for radiology reporting per year. Instructions for radiology reporting mostly are based on apprenticeship model. Trainees learn primarily from one-on-one interaction with attending radiologists and more senior trainees in this model. It has been reported that 98% of medical radiology residents did not receive any education about reporting, and 78% of the residents prepared the reports under supervision and guidance of a senior resident.

In this study, 4.1% of medical radiologists and 33% of dentomaxillofacial radiologists reported that no education was received related with reporting during their training period. Additionally, 77.6% of medical radiologists and 21.7% of dentomaxillofacial radiologists noticed that they prepared the reports in guidance of more senior trainees. The results of this study for medical radiologists about absence of education regarding reporting were different, but about preparation of reports under supervision of a senior resident were very similar to the results of previous studies.

Bosmans et al. stated that 56.7% of the radiologists had learned the reporting during their training and Lam et al., reported that 83.7% of the residents said learning is better when teaching others and 86.4% of them thought teaching opportunities improved their educational experience. All previous studies have been analyzed by medical radiologists.
and/or residents. No study has focused on approaches of dentomaxillofacial radiologists. In this study, approaches of medical and dentomaxillofacial radiologists were compared about reporting. The majority of dentomaxillofacial radiologists remarked that they learned the reporting from teaching staff, whereas most medical radiologists remarked that they learned from more senior trainees. Almost all participants (99%) agreed about the education of radiology report should be a mandatory part of radiology residency training.

The radiology report is divided into six sections: examination, history/indication, technique, comparison, findings and impressions. This type of report is considered as structured report including paragraphs and headings that distinguish the basic elements of the reports. Bosmans et al. reported that most of the radiologists mentioned the use of separate headings for each organ system when reporting complex examinations. Powell et al. stated that 59.5% of radiologists were satisfied with their structured report. In another study, most radiologists represented that the reports should occur in separate paragraphs such as clinical information, radiologic findings, conclusion and impressions. Also, 91% of medical radiologists stated that a conclusion should be taken at the end of report if it is longer than a few lines. In the present study, 79.1% of dentomaxillofacial radiologists and 81.2% of medical radiologists reported that their own radiology reports consisted of separate paragraphs as clinical information, radiologic findings and conclusion. The results of this study were in accordance with previous studies.

A radiology report must be dictated in a plain language. Some authors have suggested that it could be understood by the average high school graduate. However, this condition may be disliked by more experienced and specialized practitioners. Knowledge and expertise level of the referrer should be considered by the radiologist when the report is constructed. Medical radiologists mostly thought that a radiology report should be easily intelligible, and radiologists should use common words with referrer clinicians. In the present study, 60.9% of dentomaxillofacial radiologists and 84.1% of medical radiologists stated that common words with clinicians were used to read the radiology report more easily. The results of this study were in accordance with previous studies.

Alan et al. emphasized that, most radiologists experienced their patients’ request of verbal information after examination. In the same study, 36% of radiologists thought that verbal information should be given when the patient wants. In this study, most of all participants reported that patients mostly want verbal information about imaging results. This result was in accordance with previous study.

There were some limitations in the study. Firstly, this study was performed in Turkey and results may vary in different societies. Secondly, the number of medical radiologists was higher than the others, due to the limited number of dentomaxillofacial radiologists.

In conclusion, this is the first study pointing out the approaches of dentomaxillofacial radiologists about reporting. Good radiological report is a relatively new task for dentomaxillofacial radiologists in comparison with medical radiologists. All the radiologists have become more liable to the patients due to increasing malpractice lawsuits in recent years. The results of this study showed that both dentomaxillofacial and medical radiologists were mostly in agreement and their approaches were similar regarding the radiological reports.

All the radiologists concurred for the main topics as listed below:

1. Specific lectures regarding the preparation of good radiologic report should be added to
the curriculum during training of both medical and dentomaxillofacial radiology expertise.

2. Structured radiologic reports including separate paragraphs such as clinical information, radiologic findings, conclusion and impressions are useful in clinical practice. This type of reports was preferred by both medical and dentomaxillofacial radiologists.

3. The radiologists generally use common words with the clinicians in the reports.

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Appendix
The survey
1. Age:
2. Sex: ☐ Female  ☐ Male
3. Institution:
   Academic degree: ☐ Resident  ☐ Lecturer  ☐ Assistant Professor
   ☐ Associate Professor  ☐ Professor  ☐ Specialist
4. How many years have you worked at radiology department? (including PhD and specialized)
   ☐ 0 - ≤6 month  ☐ 6 month> - ≤1 year  ☐ 1> - ≤5 years
   ☐ 5> - ≤10 years  ☐ More 10 years
5. How many years have you written report?
   ☐ I have not written report  ☐ 0 - ≤6 month  ☐ 6 month> - ≤1 year
   ☐ 1> - ≤5 years  ☐ 5> - ≤10 years  ☐ More 10 years
6. Which sources did you use during your training as radiologist how to make a good report?
   ☐ Teaching staff  ☐ Article
   ☐ More senior trainees  ☐ Course  ☐ No education
7. Which format have you used in radiology report construction?
   ☐ Free text format
   ☐ Structured report (divided standardizes headings like clinical information, findings, impressions etc.)
8. Do the patients want verbal information about findings after examination?
   ☐ Often  ☐ Sometimes  ☐ Never
9. Do your radiology reports consist of separate paragraphs such as clinical information, findings and the conclusion?
   ☐ Yes  ☐ No
10. Do your radiology reports end with a conclusion?
    ☐ Yes  ☐ No
11. Do your radiology reports include technical details?
    ☐ Yes  ☐ No
12. Should radiology training programs include radiology report construction?
    ☐ Yes  ☐ No
13. How a language have you use when you write report?
    ☐ I use medical language including radiologic terminology.
    ☐ I use common words with clinicians to read the radiology report more easily.
    ☐ I use simple, basic language which community understand.
14. Which examinations do you report? (for medical radiologists)
    ☐ Ultrasound  ☐ Magnetic resonance imaging  ☐ Computed tomography  ☐ Conventional methods
15. Which examinations do you report? (for dentomaxillofacial radiologists)
    ☐ Periapical radiograms  ☐ Panoramic Radiograms  ☐ Cone-beam computed tomography
    ☐ Ultrasound  ☐ Others (Temporomandibular Joint Graphy, Cephalography etc.)