

Scintigraphic evaluation of swallowing function in patients with rheumatoid arthritis

Romatoid artritli hastalarda yutma fonksiyonunun sintigrafik olarak değerlendirilmesi

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ABSTRACT

Objectives: This study aims to evaluate the swallowing function using scintigraphy in patients with rheumatoid arthritis (RA).

Patients and Methods: Between June 2017 and September 2017, a total of 20 RA patients (14 males, 6 females; mean age 36 years; range, 28 to 57 years) who received clinic and laboratory diagnosis and followed in our hospital were included in this study. The control group consisted of 20 healthy volunteers (14 males, 6 females; mean age 35 years; range 25 to 56 years). Disease activity was evaluated using the Disease Activity Score-28 (DAS28). Swallowing function was evaluated using scintigraphy.

Results: The mean duration of disease was 12 years. Two patients with RA had prolonged oral passage time and higher oral residual levels. The oropharyngeal distance measured in the patient group was found to be relatively longer than the control group, although it did not reach statistical significance.

Conclusion: Swallowing functions and disease activity can be evaluated using scintigraphy in patients with RA.

Keywords: Rheumatoid arthritis, scintigraphy, dysphagia.

ÖZ

Amaç: Bu çalışmada romatoid artritli (RA) hastalarda sintigrafi ile yutma fonksiyonu değerlendirildi.

Hastalar ve Yöntemler: Haziran 2017 - Eylül 2017 tarihleri arasında, klinik ve laboratuvar tanısı konan ve hastanemizde takip edilen toplam 20 RA hastası (14 erkek, 6 kadın; ort. yaş 36 yıl; dağılım, 28-57 yıl) çalışmaya dahil edildi. Kontrol grubu 20 sağlıklı gönüllüden (14 erkek, 6 kadın; ort. yaş ? yıl; dağılım, ?-? yıl) oluşuyordu. Hastalık aktivitesi Hastalık Aktivite Skoru-28 (DAS28) ile değerlendirildi. Yutma fonksiyonu sintigrafik olarak değerlendirildi.

Bulgular: Ortalama hastalık süresi 12 yıl idi. İki RA'lı hastada uzamış oral pasaj süresi ve daha yüksek oral rezidü seviyesi izlendi. Ölçülen orofarenks mesafesi kontrol grubuna kıyasla hasta grubunda nispeten daha uzun olmakla birlikte, bu fark istatistiksel olarak anlamlı değildi.

Sonuç: Yutma fonksiyonları ve hastalık aktivitesi RA'lı hastalarda sintigrafik olarak değerlendirilebilir.

Anahtar sözcükler: Romatoid artrit, sintigrafik, disfaji.

Rheumatoid arthritis (RA) is a common inflammatory disease which affects 1 to 2% of the global population and is seen two or three-times more among men than women with a course of joint involvement.^[1] Rheumatoid arthritis is a systemic

inflammatory disease, where, in addition to synovial joints, the other tissues and organs are involved. Moreover, RA can also influence the non-joint structures such as tendons, ligaments, and face.^[2] The extra-articular symptoms of RA should be treated

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and followed-up aggressively.^[3] The extra-articular symptoms are observed in 40% of the RA patients at the beginning or during the course of disease.^[3] Among the RA patients having high rheumatoid factor (the antibody corresponding to Fc component of immunoglobulin G), the extra-articular symptoms such as rheumatoid nodule, rheumatoid vasculitis, respiratory, neurological, digestive, cardiovascular, cutaneous, hematological, and ocular complications are frequently observed.^[4-6] Mouth dryness and swelling in salivary gland are frequently seen in RA. Among these patients, the secondary Sjögren syndrome is widely seen.^[7] The gastrointestinal complications in RA are usually observed to be iatrogenic and medication-related. The primary involvement of gastrointestinal system due to the mesenteric vasculitis causing intestinal infarct is rare.^[7] This may cause acute abdominal pain, intestinal hemorrhage, and perforation. Although it is not directly related with arthritis activity, rheumatoid factor and subcutaneous nodules are widely observed as in other vasculitis diseases.^[1,2,8]

Scintigraphy is a non-invasive method which allows objectively and accurately evaluation of the oral, pharyngeal, and esophageal phases through the images generated by the computer. The oral, pharynx, and proximal esophagus composite images are taken, and a set of time-activity curves is formed. The role of scintigraphy in evaluation of oropharyngeal dysphagia was defined in previous studies.^[9] However, it has a limited role in revealing the anatomic reasons of the swallowing dysfunction. Despite this, no study focusing on the swallowing function has been carried out in RA patients. Therefore, in the present study, we aimed evaluate the swallowing function using scintigraphy among RA patients.

PATIENTS AND METHODS

Between June 2017 and September 2017, a total of 20 RA patients (14 males, 6 females; mean age 36 years; range, 28 to 57 years) who received clinic and laboratory diagnosis and followed in our hospital were included in this study. The control group consisted of 20 age-matched healthy volunteers (14 males, 6 females; mean age 35 years; range 25 to 56 years). All data were collected prospectively. A written informed consent was obtained from each patient. The study protocol was approved by the Erciyes University Faculty of Medicine Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

On fiberoptic laryngoscopic examination, no mass, laryngeal obstruction, or larynx inflammation was

observed in any of the patients. Bilateral vocal cord motion was considered normal. None of the patients were receiving muscle relaxant agents. The rheumatological examination was performed by a single researcher of the study by evaluating the symptom and severity of disease. Disease activity was evaluated using the Disease Activity Score-28 (DAS28).^[10] Higher scores more than 5.1 indicate active disease, 5.1 and 3.2 indicate moderate disease activity, 3.2 and 2.6 indicate low level of disease activity, and <2.6 indicate remission.

Scintigraphic evaluation

The images were taken by using general purpose collimator (Infinia, General Electric Medical Systems, Milwaukee, WI, USA) equipped with double-headed Gamma camera. 10 images (64×64 pixels) taken per second. The intervention protocol was explained to the patients in study group. The patient was placed in front of the collimator, the head was laterally positioned, and the chin was directed horizontally. The patients were instructed not to move their head during the scintigraphy examination. Two radioactive markers filled with small amount of Technetium-99m (99mTc) were given to the patients orally, and the borders of oropharyngeal site were accepted to be mastoid apex on top and lower end of cricoid cartilage on bottom. To maintain swallowing to be compatible with the physiological conditions, the patient was kept in the sitting position during the procedure. For the evaluation of the oropharyngeal function, the oral passage time (duration of discharge of the mouth in sec), pharyngeal passage time (time between the discharge of mouth and the discharge of pharynx in sec), and oropharyngeal distance (distance between mastoid apex and cricoid cartilage in mm) were evaluated.

Statistical analysis

Data were analyzed using the IBM SPSS version 22.0 software (IBM Corp., Armonk, NY, USA). Descriptive statistics of the data were evaluated with mean, standard deviation, and median values. The distribution of the variables was analyzed with the Kolmogorov-Smirnov test. Distributions of normality were evaluated by the Shapiro-Wilks test. Normally distributed values were compared with independent groups t-test and non-normally distributed data were compared by Mann-Whitney U test. A *p* value less than 0.05 was considered significant for all comparisons.

RESULTS

The mean duration of disease was 12 years. At the time of initiation of the study, all patients were receiving the treatment recommended by the treating physiatrist.

Table 1				
Oropharyngeal distance measured in patient and control groups				
	n	Mean±SD	Mann-Whitney U test	<i>p</i>
Oropharyngeal distance				
Patient group	20	68.0±8.0	161.500	0.423
Control group	20	66.6±6.4		

SD: Standard deviation.

Table 2				
Beginning time of pharyngeal phase of swallowing in patient and control groups				
	n	Mean±SD	Mann-Whitney U test	<i>p</i>
Beginning time				
Patient group	20	3.2±1.4	127.000	0.048
Control group	20	4.1±1.1		

SD: Standard deviation.

Table 3				
Ending time of pharyngeal phase of swallowing in patient and control groups				
	n	Mean±SD	Mann-Whitney U test	<i>p</i>
Ending time				
Patient group	20	5.0±2.2	159.500	0.273
Control group	20	5.3±1.2		

SD: Standard deviation.

Table 4				
Passage durations in patient and control groups				
	n	Mean±SD	Mann-Whitney U test	<i>p</i>
Passage duration				
Patient group	20	167.0±88.4	119.000	0.027
Control group	20	123.3±30.1		

SD: Standard deviation.

Two patients with RA had prolonged oral passage time and higher oral residual levels. The oropharyngeal distance measured in the patient group was found to be relatively longer than the control group. However, there was no statistically significant difference between the groups ($p>0.05$) (Table 1).

As seen in Table 2, the beginning time of pharyngeal phase of swallowing was longer in the control group than the patient group, indicating a statistically significant difference between the groups ($p<0.05$).

In addition, the ending time of pharyngeal phase of swallowing was longer in the control group than

the patient group. However, there was no statistically significant difference between the groups ($p>0.05$) (Table 3).

As shown in Table 4, the passage durations of the patient group were found to be longer than the control group, indicating a statistically significant difference between the groups ($p<0.05$).

DISCUSSION

Rheumatoid arthritis is a common autoimmune disease which affects about 3% of adult population and 35/100,000 of pediatric population.^[11] It is a

systemic disease affecting all of the joints in the body. The course of disease is usually characterized with chronicity advancing frequently to disability and the rises and falls. When considered solely, the head and neck manifestations of RA are the obvious indicators of this systemic disease that mimics the inflammatory and neoplastic medical conditions. Otorhinolaryngological signs and symptoms are variable, and they have not been completely identified yet, although the most prevalent one is the joint involvement including temporomandibular joint and crico-arytenoid joint.^[12] In general, in addition to the functional or anatomic laryngological changes, autoimmune diseases and RA may cause dysphonia; all of them have adverse effects and limitations on the quality of life. For the practicing physicians, rheumatologists, and ear, nose, and throat specialists, dysphonia should be an indicator for possible laryngeal involvement. Grossman et al.^[13] reported that half of RA patients had also laryngeal symptoms. Similarly, many studies showed that, in almost half of the patients, the laryngeal involvement was the single manifestation of the disease.^[14] In acute phases, the patients may complain about the inflammation, foreign body feeling in throat, and difficulty in swallowing.^[15] Laryngoscopic findings include mucosal edema, myocyte in inner laryngeal muscles, hyperemia, inflammation and swelling of the arytenoids, deteriorated motion or immobility of interarytenoid mucosa, aryepiglottic curves, epiglottis, and crico-arytenoid joint. The perturbative inflammatory masses in larynx and trachea and the rheumatoid nodules have been rarely reported in the literature. The crico-arytenoid joint in larynx is a synovial joint, and the identification of the villous synovial proliferation of rheumatoid synovitis and the characteristics of peripheral cartilage tissue were firstly made in 1960s.^[16]

Rheumatoid nodules may develop in larynx and trachea in arthritis, and they may corrode themselves with local structures.^[17] If they are large in size, these nodules may cause difficulty in breathing due to the obstruction in larynx and dysphagia due to the external stress on pharynx.^[18] Also dysphagia related with the deterioration of crico-arytenoid joint was reported. Also the dysfunction caused from the pharyngeal segment immobility, and the damage and inflammation in cervical vertebra and mandible was reported.^[19,20] Moreover, xerostomia may cause dysphagia in these patients.^[20] Dysphagia in RA is a mucosal disorder which is mainly caused from non-steroidal anti-inflammatory drugs (NSAIDs) or bisphosphonates to prevent the loss of bone due to the use of corticosteroid.^[20] Dysphagia was associated with the severity of disease.^[21] Scintigraphy is a non-invasive method allowing objectively and accurately evaluation of the oral, pharyngeal, and

esophageal phases through the computer images. The composite images of mouth, pharynx, and proximal esophagus are generated, and a set of time-activity curves is formed.^[22,23]

In conclusion, our results indicate that RA patients may have prolonged oral passage time with higher oral residual levels often originating from several factors including crico-arytenoid joint dysfunction, cervical vertebra, and mandibular inflammation and damage, xerostomia, and medication-related mucosal diseases. To the best of our knowledge, the present study is the first to address into swallowing function in RA patients. Nonetheless, we believe that further studies would contribute to the characterization of swallowing disorder and examination of the relationship with increased morbidity and mortality in RA patients.

Declaration of conflicting interests

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