

Comparison of complicated appendicitis rates between refugees and local patients

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ABSTRACT

BACKGROUND: This study aims to determine whether refugee patients are more likely to present with complicated appendicitis.

METHODS: Patients who were hospitalized and treated with the diagnosis of acute appendicitis in a single center between 2018 and 2020 were evaluated within the scope of this study, and the included patients were divided into two groups as refugees (n=140) and local patients (n=386). The primary outcome was complicated appendicitis rate, and the duration of symptoms, time to appendectomy, operation time, diagnostic modality, and length of hospital stay were also analyzed. According to operational diagnosis and pathology reports, cases were categorized as either non-complicated or complicated.

RESULTS: The complicated appendicitis rate, and the number of patients with symptoms lasting longer than 72 h were statistically more significant in refugee patients (p=0.009 and n: 186, p=0.000, respectively). The refugee patients had a younger mean age and a higher male patient rate which was statistically significant (p=0.000 for both). There was no significant difference between the groups concerning time to appendectomy, operation time, type of surgery, hospital length of stay, and diagnostic modality (p>0.05).

CONCLUSION: The findings of this study demonstrated that refugee patients have a higher complicated appendicitis rate and late admission rate, even though refugee patients have equal access to healthcare in our country. Future research is needed to identify factors affecting outcomes of refugee patients.

Keywords: Access to health care; appendicitis; complicated appendicitis; refugees.

INTRODUCTION

According to data obtained from the Directorate General of Migration Management, as of July 2019, 108,732 foreigners are hosted in 11 temporary accommodation centers in eight cities in our country, and 3,514,016 refugees live outside of the temporary accommodation centers.^[1] A report published in 2015 in the Middle East Strategic Research Center about the social effects of the Syrian refugees on Turkey mentioned that language, cultural and lifestyle differences complicate social cohesion.^[2] Moreover, in the report mentioned above, more than 500,000 patients were referred to hospitals in our country from the accommodation centers, and over 200,000 patients were operated in Turkey (there is no information for the surgical indication, such as trauma, war injuries, and other diseases).

Acute appendicitis is one of the most common surgical emergencies with a prevalence of 7–8% in a lifetime.^[3] Treatment of uncomplicated acute appendicitis is surgery, but in cases with complicated appendicitis, sometimes additional treatment such as percutaneous drainage and antibiotic treatment and afterward delayed appendectomy is needed.^[4,5] Longer hospital stay, increased morbidity, and additional healthcare costs occur in patients with complicated appendicitis. The previous studies have shown that age, sex, race/ethnicity, health insurance status affected complicated appendicitis rates.^[6–8] Studies on the impact of the refugee population on the health system in our country are mostly related to social problems. The effect of ethnic, language, socioeconomic, or cultural differences on diagnosis, treatment delay, and complication rates are unknown.

Cite this article as: Karagöz Eren S, Dönder Y. Comparison of complicated appendicitis rates between refugees and local patients. *Ulus Travma Acil Cerrahi Derg* 2022;28:62-68.

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Ulus Travma Acil Cerrahi Derg 2022;28(1):62-68 DOI: 10.14744/tjes.2020.70025 Submitted: 01.07.2020 Accepted: 14.10.2020

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We hypothesized that refugee patients might have higher rates of complicated appendicitis when compared to local patients. We, therefore, analyzed a retrospective study demographic and clinical parameters and complicated appendicitis rates of patients in a single-center that treats refugee patients at a high volume.

MATERIALS AND METHODS

One hundred and forty refugee patients who were hospitalized and treated with the diagnosis of acute appendicitis in the Kayseri City Training and Research Hospital General Surgery Clinic between 2018 and 2020 were included. For comparison with the local population, 386 local patients who were hospitalized and treated with the diagnosis of acute appendicitis in a consecutive time frame between 2019 and 2020 were included. The data of the patients were obtained from the hospital electronic medical report system retrospectively. Pediatric population, the patients who had completely missing clinical and operative data, who underwent an interval appendectomy or an appendectomy for another reason, were excluded from this study.

The patients were divided into two groups as refugee patients and local patients. The patients were also divided into groups of those diagnosed as having complicated appendicitis and non-complicated appendicitis. The primary outcome of interest was the rate of complicated appendicitis. This study was approved by the clinical research ethics committee of Kayseri City Training and Research Hospital with the number 2020/61 (accepted date: 28.05.2020).

Classification of the Appendicitis

According to surgical findings, the patients were grouped as non-complicated appendicitis and complicated appendicitis, including perforated, gangrenous, or other (periappendicular abscess, plastron appendicitis). Pathological diagnoses were grouped as appendicitis, appendicitis with localized peritonitis, gangrenous appendicitis, perforation, suppurative appendicitis, or normal appendix. According to the operation findings or pathological findings, cases with perforation, gangrene, or plastron were accepted as complicated appendicitis. The patients treated with a diagnosis of plastron appendicitis during hospitalization and who did not undergo surgery was also considered complicated appendicitis. The patients hospitalized with a diagnosis of plastron appendicitis but who did not undergo surgery were also considered complicated appendicitis.

Study Parameters and Definition

Demographic data, duration of symptoms, hospital length of stay, time to appendectomy, surgical approach, incision type, American Society of Anesthesiologists (ASA) class, operation time, final diagnosis, operational diagnosis, pathological diagnosis, white blood cell count, and diagnostic modality were all included and analyzed in this study.

Duration of symptoms was taken from the patient's objective history of present illness and was grouped as whether a patient had symptoms for 24 h or less, 24–72 h, or 72 h or more. Time to appendectomy was defined as the time from the first evaluation by the emergency department to the time of operation and was measured in hours.

Statistical Analysis

To summarize data obtained in the study, descriptive statistics were given as mean \pm standard deviation, minimum maximum (min–max) depending on the distribution of the continuous variables, while categorical variables were summarized as numbers and percentages. The normality test of the numerical variables was controlled by visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk Tests). While independent student's t-test was used for the groups that conform to the normal distribution, Mann-Whitney U tests were used in the groups that did not fit normal distribution. Chi-square test and Fischer's exact test were used to compare categorical variables. The statistical significance level was taken as 0.05 in all tests.

RESULTS

The patients' demographic, clinical, operative, laboratory, and diagnostic modalities are summarized in Table 1 between the groups. The mean age of the study population was 34 ± 13.0 (18–88) years (Table 1). The refugee patients were statistically significantly younger 28.7 ± 8.3 (18–55) years ($p=0.000$). The male patient rate was 66% when considering both groups, and it was found that the male sex was statistically significantly higher in the refugee population (76.4% vs. 69.2%, $p=0.000$).

Of the 526 patients, 82 (15.6%) were found to have complicated appendicitis at the final diagnosis. Diagnostic characteristics are summarized in Table 2. The complicated appendicitis rates of the refugee population were statistically significantly higher than the local population (22.9% vs. 13.0%, $p=0.009$) when evaluated in terms of operation findings, it was found that the complicated appendicitis rates associated with plastron or periappendicular abscess were higher in the refugee population (9.3% vs. 2.6%, $p=0.002$). Furthermore, considering the pathological findings, regardless of groups, complicated appendicitis (perforated or gangrenous) rates were 10.2%, and normal appendix rate was 8.5%. The pathological diagnoses are summarized in Table 2. Low-grade mucinous neoplasm was detected in three patients and a neuroendocrine tumor was detected in one patient. The mean age of the patients was 46 ± 18.3 (22–65) years. The patient with a neuroendocrine tumor was a refugee; all patients with mucinous neoplasm were local patients.

Data related to the duration of symptoms was only available for 186 patients (43 refugees and 143 local patients), and the

Table 1. Comparison of demographic and clinical features of groups

Variable	Groups			p-value
	Refugee (n=140)	Local (n=386)	Overall (n=526)	
Age*	28.7±8.3 (18–55)	35.8±13.9 (18–88)	34±13.0 (18–88)	0.000
Sex†				
Female	33±(23.6)	146±(37.8)	179±(34.0)	0.002
Male	107±(76.4)	240±(62.2)	347±(66.0)	
Duration of symptoms**†				
<24 h	8 (18.6)	55 (38.5)	63 (33.9)	
24–72 h	16 (37.2)	78 (54.5)	94 (50.5)	0.000
>72 h	19 (44.2)	10 (7)	29 (15.6)	
ASA†				
I	70 (54.3)	136 (35.5)	201 (40.2)	0.000
II	57 (44.2)	220 (57.4)	277 (54.1)	
III	2 (1.6)	27 (7)	29 (5.7)	
Surgery type†				
Laparoscopic	41 (29.3)	131 (34.2)	172 (32.9)	0.344
Open surgery	99 (70.7)	252 (65.8)	351 (67.1)	
Incision†				
Mc Burney	93 (94)	212 (84.1)	305 (86.9)	0.019
Paramedian	4 (4.0)	37 (14.7)	41 (11.7)	
Midline	2 (2)	3 (1.2)	5 (1.4)	
Hospital LOS (d)*	1.9±1.6	1.8±1.5	1.9±1.5	0.456
TTA (h)*	7.14±3.6	6.6±4.0	6.7±3.9	0.211
Operation time (min)*	57.3±20.7 (15–120)	55.8±21.4 (15–150)	56.6±20.8 (15–150)	0.644
WBC on presentation*×10 ⁹ /L	13.3±4.4 (4.9–30)	13.6±4.4 (3.2–29.1)	13.5±4.3 (3.2–30)	0.559
Diagnostic Modality†				
USG	77 (56.2)	246 (63.9)	323 (61.9)	0.256
CT	21 (15.3)	53 (13.8)	74 (14.2)	
USG+CT	39 (28.5)	86 (22.3)	125 (23.9)	
USG appendicitis diagnosis†	92 (82.1)	280 (84.3)	372 (83.8)	0.586
CT appendicitis diagnosis†	50 (79.4)	125 (86.8)	175 (84.5)	0.173

†: n (%), †: Mean±standard deviation (min-max) **: Among 186 patients with documentation. LOS: Length of stay; TTA: Time to appendectomy; WBC: White blood cell; ASA: American Society of Anesthesiologists; USG: Ultrasonography; CT: Computed tomography; min: Minute; d: Day.

number of patients with symptoms longer than 72 h was statistically more significant in refugee patients (44.2% vs. 7% p=0.000).

ASA 3 patients were statistically significantly higher in the local population (p=0.000); this difference was related to the higher mean age of the local patients. The number of pregnant patients was six; the mean age was 29.1±6.3 (20–37); only one of them had complicated appendicitis.

Three patients with plastron appendicitis were treated with antibiotic treatment and percutaneous abscess drainage, they were all local patients. It was observed that none of the

patients underwent interval appendectomy in our hospital during follow-up.

An open appendectomy was performed in 351 (66.7%) cases, and the most preferred incision was Mc Burney (305, 86.9%). However, of the patients undergoing a paramedian (n=41, 11.7%) or midline incision (n=5, 1.4%), only seven were complicated appendicitis. The number of patients who had a conversion to open surgery was ten; seven of these patients had complicated appendicitis. This difference was statistically significant (p=0.000), but there were no differences between refugees and local patients.

Table 2. Comparison of diagnosis of groups

Variable	Groups			p-value
	Refugee patients (n=140)	Local patients (n=386)	Overall (n=526)	
Final diagnosis				
Complicated	32 (22.9)	50 (13.0)	82 (15.6)	0.009
Non-complicated	108 (77.1)	336 (87.0)	444 (84.4)	
Operation diagnosis				
Non-complicated	109 (77.9)	336 (87.7)	445 (85.1)	0.004
Perforated	13 (9.3)	30 (7.8)	43 (8.2)	
Gangrenous	5 (3.6)	7 (1.8)	12 (2.3)	
Other	13 (9.3)	10 (2.6)	23 (4.4)	
Pathological diagnosis				
Appendicitis	60 (24.6)	184 (75.4)	244 (46.7)	0.564
Appendicitis plus peritonitis	46 (33.1)	117 (35.0)	163 (31.2)	
Perforated	11 (7.9)	21 (5.5)	32 (6.1)	
Gangrenous	5 (3.6)	17 (4.4)	22 (4.2)	
Suppurative	5 (3.6)	13 (3.4)	18 (3.4)	
Normal appendix	12 (8.6)	31 (8.1)	43 (8.2)	

In the post-operative period, 12 patients were hospitalized again, seven were due to postoperative intestinal obstruction, four due to intra-abdominal abscesses, and one due to stump leak. There were no statistically significant differences in the readmission rate of refugees or local patients (1 vs. 11, $p=0.310$); in addition, only four was complicated appendicitis of these patients. A patient with intraabdominal abscesses who developed fistula after percutaneous drainage was diagnosed with Crohn's Disease.

Clinical and demographic parameters between complicated and non-complicated patients are summarized in Table 3.

DISCUSSION

According to current 2017 United Nations Refugee Agency data, 65.6 million people have been forcibly displaced worldwide, Syria is one of three countries that all refugees mainly come from and 64.6% of the Syrian refugees live in our country.^[9] In an international multicenter study with over 250 healthcare professionals, eight specific difficulties were identified in the treatment of asylum seekers and refugees: language and communication problems, different understanding and mentality of disease, health, and treatment because of cultural differences, insufficient access to medical history, the anxiety of health costs, insufficiency of familiarity and insecurity with the healthcare system, the negative basic point of view of both patients, and healthcare workers and social destitution originated by traumatic events.^[10]

It has been shown that complicated appendicitis rates and the late admission rates in the refugee population are statistical-

ly significantly higher than the local patient group. However, there was no statistically significant difference between the two groups in terms of pathological complicated appendicitis rates. The primary reason for this situation is that patients with plastron or periappendicular abscess during operation without perforation or gangrenous appendicitis were diagnosed as suppurative or appendicitis with peritonitis. Perforation rates increase in the male sex, advanced and young age groups, but the time from the onset of the patient's symptoms to receiving first medical attention is reported to be the most important predictor of complicated appendicitis. Consequently, this condition has been shown to be the result of a delay in seeking medical help, resulting in increased morbidity and healthcare costs.^[6,11,12] In our series, the patients whose symptoms were longer than 72 h were statistically significantly higher in complicated appendicitis (44.2% vs. 4.5% $p=0.000$) and refugees. Although some authors emphasize the importance of physician delay as a cause of complicated appendicitis, in a systematic review, appendectomy performed within the first 24 h from the presentation is not associated with an increased risk of perforation.^[13] In another study, including 9048 patients, there was no relationship between time to treatment and perforation.^[14] In our study, there was no difference in time to appendectomy among groups, or between complicated and non-complicated patients. In this study, complicated appendicitis rates of refugee patients were high, and late admission rates were high. Information about the duration of the symptoms of all patients was not available, so it is not clear whether the factor affecting complicated appendicitis rates is only the late admission or the race/ethnicity difference.

Table 3. Comparison of demographic and clinical features of the complicated and non-complicated patients

Variable	Groups		p-value
	Non-complicated (n=444)	Complicated (n=82)	
Age	23.7±12.7 (18–84)	35.4±14.5 (18–88)	0.284
Sex [†]			
Female	33±(23.6)	146±(37.8)	0.002
Male	107±(76.4)	240±(62.2)	
Duration of symptoms ^{**†}			
<24 h	60 (44.8)	3 (5.8)	0.000
24–72 h	68 (50.7)	26 (50.0)	
>72 h	6 (4.5)	23 (44.2)	
ASA [†]			
I	179 (41.0)	27 (36.0)	0.117
II	237 (54.2)	40 (53.3)	
III	21 (4.8)	8 (10.7)	
Surgery type [†]			
Laparoscopic	157 (35.4)	15 (19.0)	0.344
Open surgery	287 (64.6)	64 (81.0)	
Incision [†]			
Mc Burney	248 (86.4)	57 (89.1)	0.019
Paramedian	37 (12.9)	4 (6.3)	
Midline	2 (0.7)	3 (4.7)	
Hospital LOS (d)	1.6±1.1	3.3±2.4	0.000
TTA (h)	6.7±3.9	7.5±3.6	0.253
Operation time (min)	54.5±18.7 (15–120)	68.3±27.0 (15–150)	0.000
WBC on presentation (×10 ⁹ /L)	13.3±4.3 (3.2–29)	14.0±4.6 (6.4–30)	0.559
Diagnostic Modality [†]			
USG	280 (63.6)	43 (52.4)	0.256
CT	64 (14.5)	10 (12.2)	
USG+CT	96 (21.8)	29 (35.4)	
USG appendicitis diagnosis [†]	311 (83.4)	61 (85.9)	0.595
BT appendicitis diagnosis [†]	139 (83.7)	36 (87.8)	0.519
USG complicated diagnosis [†]	4 (1.1)	10 (15.4)	0.000
CT complicated diagnosis [†]	3 (1.8)	10 (26.3)	0.000

[†]: n (%), [‡]: Mean ± standard deviation (min-max) ^{**}: Among 186 patients with documentation. LOS: Length of stay; TTA: Time to appendectomy; WBC: White blood cell; ASA: American Society of Anesthesiologists; USG: Ultrasonography; CT: Computed tomography; min: Minute; d: Day.

Multiple investigators have found that healthcare barriers lead to delays in presentation, and increased perforation, additionally insurance status^[7,15] and race/ethnicity^[8,16–18] have been associated with perforation. The exact etiology of acute appendicitis has not been clearly elucidated, and it is seen in different incidences according to geographic location and race/ethnic groups. Differences between race/ethnic groups have been reported in studies in South Africa, the USA, and Brazil, with a low incidence rate in black and Asian populations and a high incidence rate in the Span-

ish population.^[16–18] However, Pieracci et al.^[19] and Lee et al.^[20] found that other racial and ethnic groups had lower or similar to have rates of perforation compared to white adults. Moreover, many studies in the pediatric population have conflicting results regarding the perforation rates based on race or ethnicity.^[21] In a study analyzing the incidence of appendicitis in first and second-generation immigrants in Sweden and international and local adoptions, high incidence rates were found in immigrants and international adoptees to Sweden and the Swedish population for both normal and

perforated appendicitis. The incidence rate of appendicitis is low in persons with African and Asian origin and high in persons with South American origin. These differences remain in second-generation immigrants and are also seen in adoptees from these regions.^[22]

Despite regulations for access to healthcare for refugees, healthcare is a problem for refugees.^[23] Syrian Refugees and Health Services Report prepared by the Turkish Medical Association in 2014, it has been stated that not knowing the risky groups in terms of the health of Syrian refugees, the need for preventive services, chronic patients, acute diseases, emergency health care, medicine, home healthcare services and inability to detect infectious diseases constitute an important problem.^[24]

In the literature, access to hospital care is a critical determinant of appendiceal perforation rates.^[10] Based on the 2014 Temporary Protection Regulation, Syrian refugees in our country are given a “Temporary Protection Identity Certificate” to benefit from healthcare services, and even if there is no temporary protection identity document on patients applying for emergency cases, emergency services must be provided.^[25] On the other hand, they can be admitted to state hospitals by the social security number provided by government. This number cannot be used for getting service from university or private hospitals, unless they are referred from another hospital or they are charged. The only exceptions for using social security numbers are emergency and intensive care services.^[24] Although they can access to all hospitals in emergency situations, not knowing this by the refugee population, the difficulties they experience in these hospitals or do not consider abdominal pain as an emergency may be the reason for late admissions.

In studies on the health-related problems experienced by refugees in our country, it was stated that refugees can easily access health services in the province where they are registered, but they have access problems outside the province where they are registered^[26] and also that access to health services is a problem, especially for women.^[27]

Access to healthcare is not only related to access to care or insurance; communication problems due to the language differences with refugees, or difficulty in reaching an interpreter, may cause delays in the diagnosis of early-onset cases where physical examination findings are not fully established. In a study assessing the effectiveness of the management of health services about refugees in Turkey, it is mentioned that the communication problem is one of the main problems and the lack of Arabic interpreters in hospitals causes this.^[23,27] It is emphasized that the best way to overcome this problem should be an interpreter in every hospital.^[23,24] Furthermore, the fact that the health-related data of refugees cannot be collected regularly, the medical history of patients cannot be accessed, being excluded by the healthcare personnel due to

communication problems and other prejudices may cause late admission and delay in diagnosis.^[24,28]

In another study conducted in a certain region on the access of refugees to health services, it was determined that they do not have serious problems in accessing health services.^[29] This situation has been attributed to the fact that the Syrians were adopted by the people of the region, the study was conducted in the industrial zone and 60% of the participants had a regular income.

However, the studies are limited to a certain region or camps, comparative and more comprehensive studies are required on Syrian refugees living in different provinces.

In this study, there are several limitations for a number of reasons. This is a retrospective study limited to a single institution and does not represent all refugee patients who live in our country. Furthermore, the duration of the symptom is one of the most important predictors for complicated appendicitis, but data on the symptoms of all patients was not available.

Conclusion

The findings of this study demonstrated that refugee patients have higher complicated appendicitis rates. Furthermore, the late admission rate was higher than it was for local patients, despite the fact that refugee patients had equal access to healthcare in our country. This latter finding may be because of cultural, language, or communication problems. It is not known whether or not race/ethnicity difference affects complicated appendicitis rates. Future investigations are needed to identify factors affecting refugee outcomes and to focus efforts aimed at reducing the incidence of complicated appendicitis.

Ethics Committee Approval: This study was approved by the Kayseri City Training and Research Hospital Clinical Research Ethics Committee (Approval number: 98/61, date: 28.05.2020).

Peer-review: Internally peer-reviewed.

Authorship Contributions: Concept: S.K.E.; Design: S.K.E.; Supervision: S.K.E.; Materials: S.K.E.; Data: S.K.E.; Analysis: S.K.E.; Literature search: S.K.E., Y.D.; Writing: S.K.E.; Critical revision: S.K.E., Y.D.

Conflict of Interest: None declared.

Financial Disclosure: The authors declared that this study has received no financial support.

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ORİJİNAL ÇALIŞMA - ÖZ

Mülteci ve yerel hastalar arasında komplike apandisit oranlarının karşılaştırılması

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AMAÇ: Bu çalışmanın amacı, mülteci hastaların komplike apandisit ile başvurma olasılığının daha yüksek olup olmadığını belirlemeyi amaçlamaktadır. **GEREÇ VE YÖNTEM:** Çalışma kapsamında 2018–2020 yılları arasında akut apandisit tanısı ile yatırılarak, tedavi edilen hastalar değerlendirilmeye alındı, çalışma popülasyonu mülteci hastalar (n=140) ve yerel hastalar (n=386) olarak iki gruba ayrıldı. Çalışmanın birincil sonucu komplike apandisit oranlarıydı, semptomların süresi, apendektomiye kadar geçen süre, tanısız yöntemler ve hastanede kalış süresi ayrıca değerlendirildi. Ameliyat sırasındaki bulgular ve patoloji raporlarına göre olgular komplike ve non-komplike apandisit olarak sınıflandırıldı.

BULGULAR: Komplike apandisit oranları ve semptom süresi 72 saatten daha uzun olan hasta sayısı mülteci hasta grubunda istatistiksel olarak daha anlamlı idi (sırasıyla, p=0.009 ve n=186, p=0.000). Mülteci hastaların yaş ortalaması daha gençti ve erkek hasta oranı istatistiksel olarak anlamlı şekilde daha yüksekti (her ikisi için p=0.000). Gruplar arasında apendektomi zamanı, ameliyat süresi, cerrahi yöntem, hastanede yatış süresi ve tanısız yöntemler açısından anlamlı fark yoktu (p>0.05).

TARTIŞMA: Ülkemizde mülteci hastalar sağlık hizmetlerine eşit erişim imkanına sahip olmalarına rağmen, bu çalışmanın sonuçları mülteci hastaların daha yüksek komplike apandisit ve geç başvuru oranlarına sahip olduklarını göstermiştir. Mülteci hastaların sonuçlarını etkileyen faktörleri belirlemek için gelecekte yapılacak araştırmalara ihtiyaç vardır.

Anahtar sözcükler: Apandisit; komplike apandisit; sağlık hizmetine ulaşım; sığınmacılar.

Ulus Travma Acil Cerrahi Derg 2022;28(1):62-68 doi: 10.14744/tjtes.2020.70025