ORIGINAL ARTICLE

The effect of emergency room consultations on emergency general surgery operations

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ABSTRACT

BACKGROUND: Hospitalizations in emergency general surgery (EGS) cases in the USA have increased by 28% since 2001. The costs of these cases are estimated to increase by 45% annually until 2060, reaching 41.20 billion dollars. According to the literature, the general surgery clinic team allocates an average of 5.5 h a day for emergency room consultations. The aim of this study is to determine the effects of consultations from the emergency room in our country on the EGS approach and to create appropriate solution proposals with the data obtained from the regional hospitals.

METHODS: The source of the data in our study is the number of EGS cases presented by 10 regional hospitals at the Central Anatolia regional meetings of The Turkish Association of Trauma and Emergency Surgery between 2017 and 2020. MATLAB R2021b (The MathWorks, Inc., Natick, Massachusetts, USA) and SPSS (IBM SPSS Statistics for Windows, version 22.0, IBM Corp., Armonk, NY, USA) programs were used for data analysis and graphics creation.

RESULTS: The hospitalization/consultation rate was evaluated as the success of the doctors working at the emergency department in recognizing EGS cases; the average value was 20.15% across all hospitals. The surgery/emergency hospitalization rate, which shows rate of the hospitalized patients underwent surgery, is 59.17% when all centers are taken into account. The rate of surgery/admission in acute cholecystitis (ACC) cases is 31.49% for all centers. It is seen that the hospitalization/consultation rate decreases with the increase in hospital workload. The rate of laparoscopic/total appendectomy is 22.78% across all centers. There is a correlation between acute appendicitis cases and EGS consultation numbers, but there is no correlation between laparoscopic appendectomy and consultation numbers. In addition, it is seen that medical follow-up is preferred in ACC cases in centers where the consultation burden is increased; cholecystectomy is preferred at a higher rate in centers where the consultation burden is less. National EGS systems are needed and tried to be developed to improve the approach and outcomes of EGS patients worldwide.

CONCLUSION: It is considered essential to establish a national EGS maintenance system that coordinates country resources and optimizes outcomes.

Keywords: Appendectomy; cholecystitis; consultation; emergency general surgery.

INTRODUCTION

The term "emergency health services" defines all the medical interventions that should be applied to protect the life of the patient or in cases that require rapid intervention after any emergency disease or accident. Hospitalizations for emergency general surgery (EGS) cases in the USA have increased by 28% since 2001 and exceeded 27 million patients per year. This annual number of patients represents more hospital admissions each year than the total of all new cancer or dia-

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betes diagnoses.[1] It is estimated that EGS admissions and costs in the USA will increase by 45% annually, reaching 41.2 billion dollars by 2060.[2]

The use of the emergency department by outpatients is a growing problem worldwide. This is an important reason why patients in need of emergency intervention cannot be treated adequately and in time.[3–5] A previous study reported that the general surgery clinic team assigns an average of 5.5 h a day for consultations of the emergency room.[6] The national confidential enquiry into patient outcome and death (NCEPOD) emphasized the low operation rates of cases consulted in surgery clinics.[5,7] EGS constitutes 11% of all hospital admissions, but represents half (50%) of all surgical mortality in the USA.[8] Therefore, optimal care and outcomes for EGS need to be investigated.[9]

In this study, evaluations were made of the emergency surgery statistics of the central hospitals of Ankara and surrounding provinces between December 2017 and March 2020 under the umbrella of the Association of Turkish Trauma and Emergency Surgery, in the light of the literature. The aim of this study was to determine the EGS problems in Turkey and to create appropriate solution proposals with the data obtained from the regional hospitals.

MATERIALS AND METHODS

This study was approved by the clinical research ethics committee of Gülhane Training and Research Hospital (no: 2021/88) and conducted in accordance with the relevant research and publication ethics.

A retrospective evaluation was made of the EGS data presented by the representatives of the hospitals participating in the Central Anatolia Region Trauma and Emergency Surgery meetings between 2017 and 2020. These included two medical faculty hospitals (MFH), seven training and research hospitals (TRH), and one state hospital (SH) which regularly attended the meetings and had data of at least 12 months. Although the data covered at least 12 months, the fact that the hospital data were not regular in the 3-year period was a limitation of the study. In the study, the number of consultations made from the emergency services, the number of hospitalizations/operations performed within the scope of AGC and their rates were evaluated on monthly averages.

To analyze the data and create the graphics, MATLAB R2021b (The MathWorks, Inc., Natick, Massachusetts, USA) and SPSS (IBM SPSS Statistics for Windows, version 22.0, IBM Corp., Armonk, NY, USA) programs were used.

RESULTS

In Table 1, where the EGS workload of the hospitals included in the study is evaluated, the numbers of EGS consultations, hospitalizations, and surgeries were used. The number of consultations for all centers was 430.32/month, with the highest number of 1186.7/month in TRH-7. The average number of hospitalizations per month for all centers was 86.7, with the highest number of 155.3/month in TRH-7. The mean number of surgeries was 51.3/month, with the highest mean of 80.0/month in TRH-6.

Table 1. Rates of EGS consultation/hospitalization and numbers of operations

Hospital	EGS consultations		EGS hospitalizations		EGS operations		Hospitalized/consulted (%)	Operated/consulted (%)	Operated/hospitalized (%)
	# Monthly	Rate %	# Monthly	Rate %	# Monthly	Rate %			
TRH-1	519.8	12.08	110.3	12.72	58.8	11.46	21.22	11.31	53.31
TRH-2	413.2	9.60	130.8	15.09	72.9	14.21	31.66	17.64	55.73
TRH-3	385.6	8.96	89.5	10.32	74.8	14.58	23.21	19.40	83.58
TRH-4	489.5	11.38	78.8	9.09	54.2	10.57	16.10	11.07	68.78
TRH-5	175.5	4.08	55.7	6.42	43.4	8.46	31.74	24.72	77.92
TRH-6	615.0	14.29	147.0	16.96	80.0	15.59	23.90	13.01	54.42
TRH-7	1186.7	27.58	155.3	17.91	75.3	14.68	13.09	6.35	48.49
MFH-1	104.3	2.42	38.0	4.38	20.9	4.07	36.43	20.04	55.00
MFH-2	389.6	9.05	47.3	5.46	22.7	4.42	12.14	5.83	47.995
SH	24.0	0.56	14.3	1.65	10.0	1.95	59.58	41.67	69.93
Total	4303.2	100	867	100	513	100			
Mean (month)	430.32		86.7		51.3		20.15	11.92%	59.17%

EGS: Emergency General Surgery; TRH: training and research hospitals; MFH: Medical faculty hospitals; SH: State hospital.

The hospitalization/consultation rate in Table 1 was evaluated as the success of the doctors working in the emergency department in recognizing EGS cases. The average value for all hospitals was 20.15%, and the highest success rate was seen in SH at 59.58%. In this parameter, the lowest rate was 13.09% in TRH-7.

The operation/patient hospitalization parameter in Table 1 is significant in terms of showing the follow-up or surgical intervention approach of the clinics and the trauma patient density. This rate was 59.17% when all centers were taken into account, and the highest rate was found to be 83.58% in TRH-3 and the lowest rate was in MFH-2 at 47.99%.

Table 2. Quantity and density evaluation of common EGS cases

Hospital	Operated AP+ACC		ACC					AP		
	Quantity	Rate/ all cases (%)	Hospitalized	Follow-up	Operated	Operated/ hospitalized (%)	Follow up/ hospitalized (%)	Quantity	LAP/ Total AP (%)	Rate/ Total op (%)
TRH-1	40.5	68.87	14.1	10.3	3.8	26.95	73.05	36.7	14.4	62.41
TRH-2	49.9	68.45	21.0	16.0	5.0	23.81	76.19	44.9	13.1	61.59
TRH-3	37.2	49.73	13.5	11.3	2.2	16.30	83.70	35.0	22.0	46.79
TRH-4	43.2	79.70	11.8	7.3	4.5	38.13	61.86	31.4	29.3	57.93
TRH-5	29.0	66.82	6.0	4.0	2.0	33.33	66.67	27.0	22.6	62.21
TRH-6	68.4	85.5	24.7	14.7	10.0	40.49	59.51	43.7	32.0	54.63
TRH-7	61.3	81.41	19.7	15.0	4.7	23.86	76.14	56.6	16.0	75.17
MFH-1	12.6	60.28	4.8	2.3	2.5	52.08	47.92	7.8	16.7	37.32
MFH-2	8.3	36.56	8.0	3.7	4.3	53.75	46.25	8.3	0.00	36.56
SH	2.6	26.00	1.2	0.9	0.3	25.00	75.00	2.3	0.00	23.00
Total	353		124.8	85.5	39.3			293.7		
Mean	35.3	68.81	12.48	8.55	3.93	31.49	68.51	29.37	22.78	57.25

EGS: Emergency General Surgery; AP: Appendectomy; LAP: Laparoscopic appendectomy; ACC: Acute cholecystectomy; TRH: training and research hospitals; MFH: Medical faculty hospitals; SH: State hospital.

Table 3. Quantity and density evaluation of other EGS and forensic cases

Hospital	Quantity of operations	Rate/Total EGS ops (%)	Rate/total hospitals (%)	Forensic cases		
				Quantity	Rate/Total EGS ops (%)	Rate/total hospitals (%)
TRH-1	18.3	31.12	11.44	5.3	9.01	8.9
TRH-2	23.0	31.55	14.38	8.7	11.9	14.57
TRH-3	37.6	50.27	23.5	10.3	13.8	17.25
TRH-4	11.0	20.30	6.9	6.4	11.8	10.72
TRH-5	14.4	33.18	9.0	12.0	27.6	20.1
TRH-6	11.6	14.50	7.3	2.0	2.5	3.35
TRH-7	14.0	18.59	8.75	6.0	8.0	10.05
MFH-1	8.3	39.71	5.2	4.7	22.5	7.9
MFH-2	14.4	63.44	9.0	2.3	10.1	3.85
SH	7.4	74.00	4.6	2.0	20	3.35
Total	160			59.7		
Mean	16	31.19		5.97	11.6	

EGS: Emergency General Surgery; TRH: training and research hospitals; MFH: Medical faculty hospitals; SH: State hospital.

In Table 2, acute cholecystitis (ACC) and acute appendicitis (AP) cases, which constitute the most common case group in AGC, are evaluated. The mean number of AP+ACC cases was 35.3/month, the highest number was 68.4/month in TRH-6 on a monthly basis, and the lowest number was in SH with 2.6/month. The ACC+AP rate in total EGS operations was 68.81% in total, with the highest rate in TRH-6 at 85.5% and the lowest rate in SH at 26.0%.

In Table 2, the rate of surgery to hospitalizations was 31.49% in total, with the highest rate of surgery seen in MFH-2 at 53.75% and the lowest rate in TRH-3 at 16.30%.

In terms of AP, the monthly mean was 29.37 across all centers, the highest number was 56.6/month in TRH-7, and the lowest number was 2.3/month in SH. The LAP/total AP ratio was 22.78% in total. No LAP was performed in MTF-2 and SH, and among the centers where LAP was performed, the highest rate was 32.0% in TRH-6 and the lowest was 16.0% in TRH-7. The ratio of AP to the total number of AGC operations was 57.25% for all centers, with the highest rate in TRH-7 at 75.17% and the lowest rate in SH at 23.0%.

In Table 3, under the title of "Other Cases," all forensic cases such as gunshot wounds and stab wounds and non-forensic cases except AP+ACC such as acute pancreatitis, ileus, and fasciitis are evaluated. The monthly average of other cases in the centers included in the study is 16, of which 5.97 are forensic cases. The rate of other cases within the Total EGS Surgery is 31.19%, of which 11.6% is forensic cases. While the highest number of other cases was seen in TRH-3 at 37.6/month, the center with the highest percentage of the other cases was SH at 74.0% (7.4/month). The lowest rate was 14.50% (11.6/month) in TRH-6. The highest forensic case density was in TRH-3 with 10.3/month (13.8%) cases.

DISCUSSION

According to the results of this study, it was seen that 27.6% of the total consultations, 17.9% of the hospitalizations, and 14.7% of the surgeries from the regional hospitals were in TRH-7 and this hospital undertakes the highest workload in the region. This difference between other regional hospitals and TRH-7 was thought to be due to stronger infrastructure, more hospitalization capacity and number of personnel.

As the number of EGS consultations increased (Table 1), it was seen that hospitalization/consultation and surgery/consultation rates decreased. In the study, the high rate of hospitalization/consultation was evaluated as the success of emergency physicians in recognizing EGS cases. Among the centers evaluated in the study, SH was the most successful center compared to the average (59.58% vs. 20.15%), and the most consulted TRH-7, at 13.09%, was far below the average. As shown in (Fig. 1), the AGC hospitalization/consultation rate decreased with the increase in hospital workload. From this point of view, the reasons for the higher rate of EGS hospitalization/consultation in SH compared to other hospitals were the longer time allocated to the patients due to the low patient load in this center's emergency department, the fact that the case profile contains less co-morbidities than those who apply to TRHs and MFHs, and the ability to refer difficult EGS cases to other hospitals. It was also thought that the emergency service staff of this hospital consisted of experienced practitioners.

The findings of the NCEPOD also drew attention to the inverse relationship between the number of consultations and the number of operations, emphasizing that the number of surgeries decreased as the number of consultations to surgery clinics increased.[5,7]

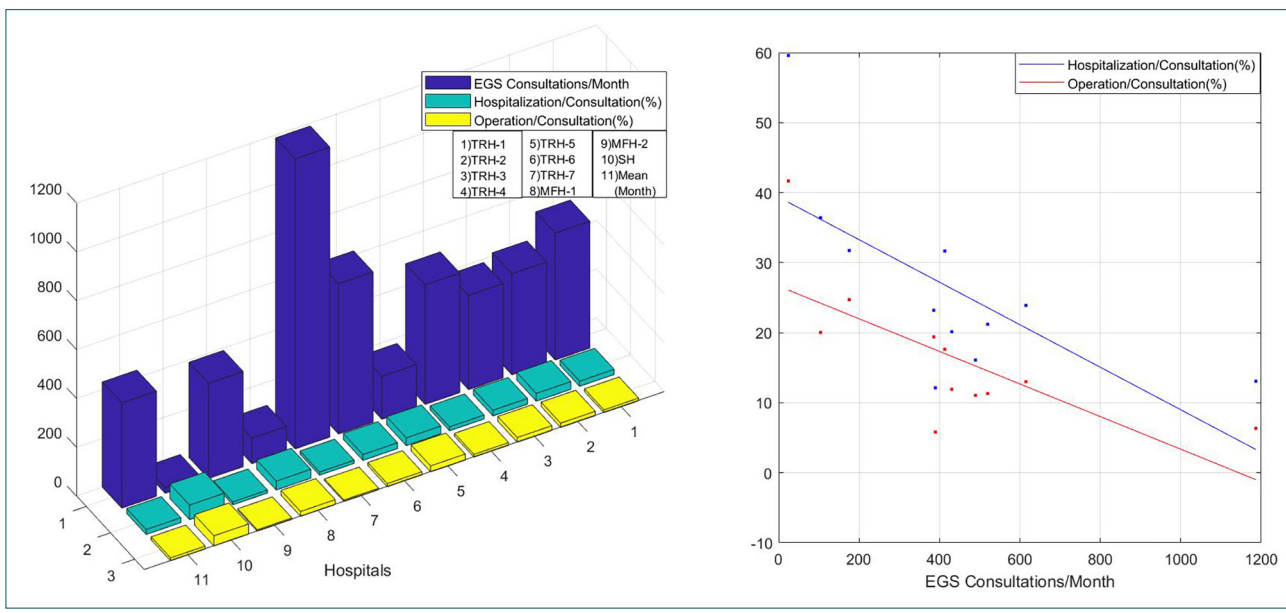

Figure 1. Number of hospital consultations, rates of hospitalization/EGS consultation, and operation/consultation.

Another parameter as shown in Table 1 is the operation/admission rates calculated over monthly averages. This rate was 59.17% on average for the regional hospitals and gives an idea about the type of cases coming from the emergency department and the approach of the clinic. Considering these 2 parameters, if SH is excluded, the highest rate of surgery/hospitalization is seen in TRH-3 with 83.58% and TRH-5 with 77.92%. Similar rates are seen in other TRHs (48.49–68.78%).

The high number of trauma cases and forensic cases such as gunshot wounds, stab wounds, traffic accidents and falls from a height are responsible for this high rate in TRH-3 and TRH-5, which distinguishes them from other regional hospitals (EAH-3:10.3/month and EAH-5: 12/month–Table 3). It is thought that the rate of surgery/hospitalization in these 2 hospitals was higher than in the others as trauma and forensic cases require urgent surgical intervention rather than follow-up.

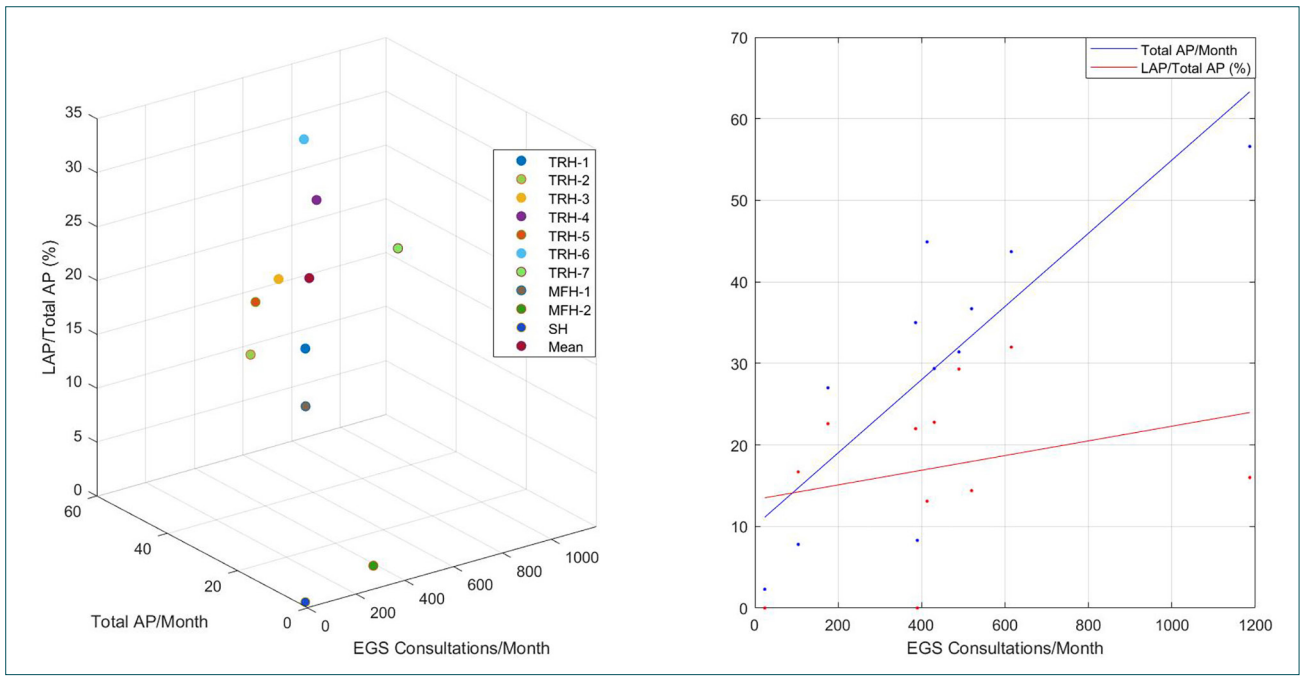

Figure 2. Number of hospital consultations, number of monthly appendectomy, and rate of laparoscopic appendectomy/total appendectomy cases.

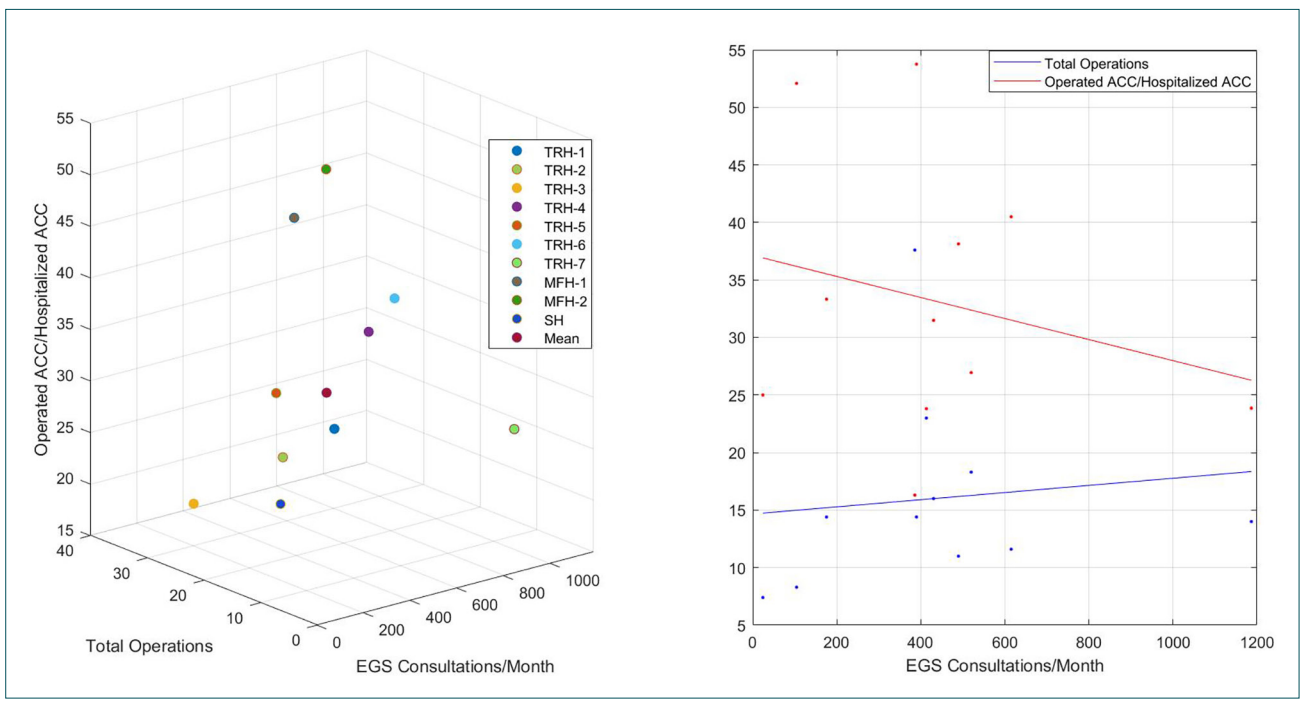

Figure 3. Number of total surgical operations and total consultations, rates of cholecystectomy/acute cholecystitis cases.

As one of the leading complaints of patients of EGS, abdominal pain has been stated in literature as the major reason for consultation. It is important for the effective functioning of the general surgery department that the patients presenting in the emergency department with this complaint are consulted to the general surgery clinic after exclusion of non-EGS causes (such as acute gastroenteritis) with a simple initial evaluation such as anamnesis and physical examination in the first step.[10] AP, which is one of the important causes of abdominal pain, is one of the most common EGS presentations with an incidence of 100–206 / 100,000 people worldwide.[11] Laparoscopic appendectomy (LAP) is being used with increasing frequency in the treatment of acute appendicitis.[12,13] According to a study by Yang et al.,[14] appendectomies constitute 68% of patients who underwent emergency surgery. In the last three meta-analyses comparing AP and LAP in complicated appendicitis, it was found that LAP reduced surgical site infection and did not make a significant difference in terms of overall morbidity and mortality, but the operation time was significantly longer.[15–17] As shown in Tables 2 and 3, a correlation was determined between the number of APs and the number of EGS consultations. As the number of EGS consultations increased, so the number of APs also increased (Fig. 2). The remarkable data in Table 2 is that there was no correlation between AP numbers and the LAP/total AP ratio. It is thought that the differences in surgeons' preference for open or LAP were effective in the emergence of these results.

ACC is another common diagnosis of EGS in the emergency department. The prevalence of gallstones is 10–15% in the general population, although there are some differences between countries.[18] Cholecystectomy is the most common therapeutic option for ACC and is considered the standard approach.[19] It has been reported in the literature that early laparoscopic cholecystectomy (within 24–72 h after the onset of symptoms) is more appropriate than delayed surgery (>7 days) for most patients with Stages I and II disease. Percutaneous cholecystostomy and new endoscopic gallbladder drainage interventions can be used as a temporary measure in those who are too ill for surgery.[20]

In the current study, the rate of operated/inpatient ACC was 31.49%, and the 2 centers with the highest rate were MFH-1 (52.08%) and MFH-2 (53.75%). As shown in Figure 3, these 2 centers had a lower number of surgeries and consultations compared to the others. As can be understood from the data, ACC cases are followed up in centers where there is a higher workload of consultation and surgery, and in centers where the workload is less, cholecystectomy is preferred first, in accordance with the literature.

Conclusion

Although established guidelines, criteria, and quality improvement processes for trauma and critical surgical care were developed by American College of Surgeons Committee of Trauma (ACS-COT) in 1976, no such work has been done for EGS to date. The problems affecting outcomes in EGS today reflect the problems faced by trauma surgery 50 years ago.[9,21] In a clinical study conducted by Havens et al.,[2] it was shown that AGC patients in hospitals with lower risk-adjusted trauma mortality had an approximately 33% lower risk of mortality. Despite an annual incidence of 4 million patient encounters and a 28% increase in hospital admissions over the past decade, such requirements for EGS care have yet to be established.[1,22] Essential elements to achieve optimal EGS outcomes include standardized EGS definitions, EGS severity assessment for risk-adjusted outcomes (clinical, anatomical, and imaging), national EGS data records including operational and non-operational management, and standardized EGS patient care using evidence-based guidelines and packages.

With the gradual development of emergency medicine, certain protocols have been established for diseases and examinations, enabling interventions to be determined more systematically. In this context, the UK established EGS, and The American Association for the Surgery of Trauma began to address the need for a national EGS system, taking on the challenge of improving outcomes for patients. EGS care should be considered a national priority, and it is imperative to establish a national EGS care system that coordinates countrywide resources and improves outcomes. It can be considered that national trauma societies, which have previously achieved success in the approaches to trauma patients and critical patients, can lead to the creation of these EGS guidelines in Turkey.

Ethics Committee Approval: This study was approved by the Gülhane Training and Research Hospital Clinical Research Ethics Committee (Date: 10.11.2021, Decision No: 2021/88).

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Conflict of Interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Acil servis konsültasyonlarının acil genel cerrahi ameliyatlarına etkisi

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AMAÇ: Amerika Birleşik Devletleri'nde Acil Genel Cerrahi (AGC) olgularında hastaneye yatışlar 2001 yılından bu yana %28 artmış olup, bu olguların maliyetlerinin 2060 yılına kadar yıllık %45 artarak 41.20 milyar dolara çıkacağı tahmin edilmektedir. Literatüre göre genel cerrahi kliniği ekibi günde ortalama 5.5 saatini acil servis konsültasyonları için ayırmaktadır. Bu çalışmadaki amaç, bölge hastanelerinden elde edilen verilerle, ülkemizde acil servisten yapılan konsültasyonların AGC yaklaşımına etkilerini belirlemek ve uygun çözüm önerileri oluşturmaktır.

GEREÇ VE YÖNTEM: Çalışmamızdaki verilerin kaynağı 2017–2020 yılları arasındaki üç yıllık süreçte Ulusal Travma ve Acil Cerrahi Derneği İç Anadolu Bölgesi Travma ve Acil Cerrahi toplantılarında 10 bölge hastanesi tarafından sunulan AGC olgu sayılarıdır. Verilerin analizi ve grafiklerin oluşturulmasında MATLAB R2021b (The MathWorks, Inc., Natick, Massachusetts, ABD) ve SPSS (IBM SPSS Statistics for Windows, version 22.0, IBM Corp., Armonk, NY, ABD) programları kullanıldı.

BULGULAR: Yatış/konsültasyon oranı acil serviste çalışan doktorların AGC olgularını tanıma başarısı olarak değerlendirilmiş olup, tüm hastaneler genelinde ortalama değer %20.15'tir. Acil servisten yatırılan hastaların ne kadarının ameliyat edildiğini gösteren ameliyat/acil yatış oranı tüm merkezler göz önüne alındığında %59.17'dir. Akut kolesistit olgularında ameliyat/yatış oranı tüm merkezler için %31.49'dur. Hastane iş yükünün artışı ile birlikte yatış/konsültasyon oranının azaldığı görülmektedir. Laparoskopik/toplam appendektomi oranı tüm merkezler genelinde %22.78'dir.

TARTIŞMA: Akut apandisit olguları ile AGC konsültasyon sayıları arasında bir korelasyon bulunmakta, fakat laparoskopik appendektomiyle konsültasyon sayıları arasında bir korelasyon bulunmamaktadır. Ayrıca konsültasyon yükünün arttığı merkezlerde akut kolesistit olgularında tıbbi takip, konsültasyon yükünün daha az olduğu merkezlerde ise daha yüksek oranda kolesistektominin tercih edildiği görülmektedir. Dünya genelinde AGC hastalarına yaklaşım ve sonuçları iyileştirmek için Ulusal AGC sistemlerine ihtiyaç duyulmakta ve bu sistemler geliştirilmeye çalışılmaktadır. Ülke kaynaklarını koordine ve sonuçları optimize eden ulusal bir AGC bakım sistemi kurmanın zorunlu olduğu düşünülmektedir.

Anahtar sözcükler: Acil Genel Cerrahi (AGC); appendektomi; kolesistit; konsültasyon.

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