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ORIGINAL ARTICLE

Internet search by the patients undergoing hernia surgery about the disease and surgeon selection

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Abstract

Aim To find out the current status of the internet use of patients who undergo surgery for repair of their hernias.

Materials and methods The patients who were diagnosed with abdominal wall hernia and scheduled for elective hernia repair were requested to answer a questionnaire. The questions were directed face-to-face by the surgeons themselves. The age, gender, education status, American Society of Anesthesiologists (ASA) physical status, place of living, health insurance, access to the Internet, surgical method, the person who did the search, previous hernia surgery, recurrence of previous hernia surgery, surgery other than hernia, and the hernia type were the recorded parameters at the first stage. Then, the answers for three main questions were taken: "Did you make a search about your hernia?", "Did you make a search about your surgeon?", "Would you prefer another surgeon if you could?"

Results A total of 200 patients were included in the study (146 male/54 female). 55.5% of the patients made an Internet search about their hernias. 58.5% of the patients made a search to find a proper surgeon. 12.5% of the patients stated that they would like to go to another surgeon for the hernia repair if it was possible. Internet search rate was significantly higher in younger patients in comparison with older patients. The higher the education level of the patients, the higher the rate of making Internet searches about the hernias and surgeons. Patients who live in the cities more frequently made Internet searches in comparison with those living in towns or villages. Internet searches about the hernias were similar in patients who had a history of hernia surgery ($n=23$, 52%), and were even operated for recurrence of the same hernia ($n=30$, 60%), compared to other patients ($p=0.569$). Similarly, the rates of conducting surgeon research of the patients in these two groups (66.7%, 56.5%, respectively) were statistically similar ($p=0.450$). The effect of ASA classification of patients on the Internet researches conducted about the disease and about the surgeons was not statistically significant ($p=0.799$, $p=0.388$, respectively). It was found that the rates of researching about the disease and about the surgeon on the Internet were significantly higher in patients who had undergone a minimally invasive surgery ($p<0.001$, $p<0.001$, respectively).

Conclusions Less than two-thirds of the hernia patients make Internet search about their disease. Higher education level, younger age, patient's preference for minimally invasive surgery and living in a city positively affect Internet search rates.

Keywords Hernia · Questionnaire · Internet searches · Proper surgeon

Introduction

As in many branches of General Surgery, significant improvements in hernia surgery attract attention in the course of time. Starting with anatomical repairs at the end of the sixteenth century, hernia surgery continues its evolution at full speed, first with the introduction of prosthetic materials and then with the development of minimally invasive methods and complex hernia repair techniques. New techniques, which bring the need for experienced surgeons, provide a basis for specialization in hernia surgery, as in other branches of General Surgery. In the light of all this

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information, we can say that the desire of investigating patients who will undergo hernia surgery to find appropriate surgical methods and experienced surgeons would increase and their research in this direction would become more frequent.

One of the sources that people most often apply to obtain information on many subjects in our time, also called the information age, is search engines and social media on the Internet. As of 2019, more than half of the world population (> four billion people) is known to be active Internet users [1]. As a consequence of the spread of health information on the Internet, patients first resort to searching for information on the Internet before receiving a professional support [2]. Searching for health-related information constitutes a non-negligible part of the queries made on the Internet search engines. Increasingly more patients today are turning to the Internet to get health information and understand their disease condition. It is anticipated that around 80% of American and 66% of European Internet users often use the Internet to search for health-related information online [3]. A study conducted by the Turkish Statistical Institute revealed that Internet use for health was 37.2% and 45.1% in 2009 and 2010, respectively, in Turkey [4].

Thus, it is worth investigating to evaluate the rate of Internet use of patients who will undergo hernia surgery, which is one of the most frequently applied Elective General Surgery procedures, and its effects on the choice of treatment.

In our study, we first aimed to determine the Internet use status of the patients who will have elective hernia surgery according to their demographic and socioeconomic characteristics by applying a questionnaire. Then, we investigated their methods for research on the Internet about hernia disease and the surgeon selection. Finally, we aimed to find out whether the research they conducted would affect their preferences in choosing a surgeon, if they had the opportunity.

Patients and methods

Ethical approval was obtained from the Clinical Research Ethics Committee of Tokat Gaziosmanpasa University before beginning the study (21-KAEK-114). The study was designed to involve three centers. Two hundred patients over the age of 18 who had elective abdominal wall hernia surgery in General Surgery clinics of Tokat Gaziosmanpasa University, Ankara Lokman Hekim University and Mus State Hospital between February 16, 2021 and June 14, 2021 were included in the study. All patients were informed about the operation after they were diagnosed with hernia, and operation preparation was done by applying the routine procedures to those who wanted to have the surgery. After being admitted to the clinic on the day of the operation, the patients were asked to answer the questionnaire prepared by the researchers conducting the study. The questions were asked face-to-face by the surgeons themselves. The parameters recorded in the first stage were age, gender, education level, American Society of Anesthesiologists (ASA) physical status, place of residence, health insurance status, Internet access, the person who conducted the search, hernia type, previous hernia surgery history, recurrent hernia status, and previous non-hernia surgery history. Afterwards, the answers to the following three questions were asked to the patients. "Have you researched about your hernia on the Internet?", "Have you researched for the surgeons on the Internet?", "Would you prefer another surgeon if you had the opportunity?" Three patients who refused to answer the questionnaire were excluded from the study. No information that would identify the patients was recorded in the questionnaire.

Sample size estimations (priori power analysis)

The sample size appropriate for the Chi-square test, which was used to test the main hypothesis of our study was estimated by power analysis. The result of the sample size estimation performed using Cohen's effect size value of 0.3 (medium effect size) showed that at least 172 patients should be included in the study to reveal significant differences between the groups with minimum of 95% power ($1 - \beta = 0.05$) and margin of error of $\alpha = 0.05$ (95% confidence interval). The G*power software package (version 3.1.9.6, Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) was used for sample size estimation.

Statistical methods

In the study, all statistical analyses were performed by SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA) software package. The normal distribution of the data was assessed by the Kolmogorov–Smirnov test. Descriptive statistics were reported as mean ± standard deviation depending on data distribution. The categorical data were given as numbers and percentages (%). The relationships between categorical variables were investigated using either the Chi-square test or the Fisher exact test, depending on the number of data in the crosstab cells. The comparison of numerical variables between two independent groups was performed by Student's *t* test, as the data were normally distributed. It was considered that the *p* values less than 0.05 was statistically significant.

Table 1 Distribution of patients by gender, education level and age

		Frequency (*n*)	Percent (%)
Gender	Male	146	73
	Female	54	27
Education level	Ignorant	17	8.5
	Primary school	94	47
	Secondary school	25	12.5
	High school	35	17.5
	College	29	14.5
		Mean	SD
Age		54.39	± 14.77

SD Standard deviation

Results

A total of 200 patients participated in the study. Of the patients, 73% ($n=146$) were male and 27% ($n=54$) were female. The mean age was 54.39 ± 14.77 years with the range of 18–89 years. Distribution of patients by gender, education level and age are presented in Table 1. Eighty-three percent of the patients ($n=166$) included in the study were actively using the Internet. Among all patients, 42.5% ($n=85$) were accessing the Internet by mobile connection, 35% ($n=70$) by Wi-Fi and 5.5% ($n=11$) by mobile + Wi-Fi. Descriptive statistics regarding the socio-demographic characteristics of the patients and their research about the disease are presented in Table 2. It was found that 56.5% of the patients ($n=113$) had undergone a non-hernia surgery, and among those, 16% ($n=32$) had had abdominal surgery and 40.5% ($n=81$) had had non-abdominal surgery. The rate of the patients who had undergone a previous hernia surgery was 26.5% ($n=53$).

Of the patients, 55.5% ($n=111$) conducted research about the disease and 58.5% ($n=117$) about the surgeon on the Internet. Among the patients researching the Internet about their disease and about finding a surgeon, 54% of those ($n=74$) conducted this research by themselves. On the other hand, it was found that 46% of the patients ($n=63$) did not conduct the research by themselves, and the research was done by their relatives or neighbors. Of the people who conducted the research other than the patient, 29.2% ($n=40$) were university graduates, 15.3% ($n=21$) were high school graduates, and 1.5% ($n=2$) were middle school graduates.

The mean age of those who conducted research on the Internet about the disease (51.44 ± 12.93) was significantly lower than those who did not (58.07 ± 12.93) ($p=0.0001$). On the other hand, the mean age of the patients who did Internet research about the surgeon (52.69 ± 14.9) and those who did not (56.78 ± 14.28) were statistically similar ($p=0.054$). The comparison of the rates of Internet use, disease and surgeon research by age groups is given in Table 3. The statistical differences by the age groups were significant in terms of the rates of Internet use and disease research ($p<0.001$, $p=0.004$, respectively), while not significant for surgeon research ($p=0.082$). It was determined that as the age group of the patients increased, the Internet use and disease research rates decreased. The surgeon search rate also decreased with increasing age; however, this decrease was not statistically significant (Table 3).

The patients were classified according to the ASA physical status classification. There were 81, 88, and 31 patients in the ASA I, II, and III groups, respectively. The effect of ASA classification of patients on the Internet researches conducted about the disease and about the surgeons was not statistically significant ($p=0.799$, $p=0.388$, respectively; Table 4).

The relationship between the socio-demographic characteristics of the patients and their research about the disease and surgeons is presented in Table 5. The rates of researching about the disease and about the surgeon by the gender were statistically similar ($p=0.515$, $p=0.649$, respectively). It was determined that 59.3% of the females ($n=32$) and 54.1% of the males ($n=79$) researched about the disease on the Internet, while 61.1% of the females ($n=33$) and 57.5% of the males ($n=84$) looked for information about surgeons. The rates of researching about the disease and about the surgeon on the Internet statistically significantly changed according to the education level ($p<0.001$, $p<0.001$, respectively). Among the patients, 86.2% of university graduates, while 37.2% of primary school graduates conducted research on the disease. It was determined that the people who researched the most about the disease were university graduates, while those who researched the least were primary school graduates. The rate of conducting surgeon research was 86.2% ($n=25$) in the university graduates and 42.6% ($n=40$) in the primary school graduate. Surgeon research was found to be conducted the most in the university graduates and the least in the primary school graduates. The rates of researching about the disease and about the surgeon were significantly affected with respect to the patient's place of residence ($p=0.001$, $p=0.016$, respectively). Of the patients living in the city center, 68.4% ($n=54$) researched about the disease, 69.6% ($n=55$) about the surgeon. Consequently, it was determined that the researches about the disease and the surgeon were conducted the most by the patients living in the city center. The rates of conducting research with respect to the Internet access method was statistically significantly different ($p<0.001$). It was found that 90.9% ($n=10$) of the patients accessing the Internet by mobile connection + Wi-Fi researched about the disease, and this rate was significantly higher comparing to those of the other groups ($p<0.001$). The effect of a history of previous hernia surgery on the Internet researches conducted about

Table 2 Descriptive statistics on patients' socio-demographic characteristics

			Frequency (*n*)	Percent (%)
Living place	Village		69	34.5
	District		52	26
	City center		79	39.5
Social security	No		5	2.5
	Green card		43	21.5
	Special insurance		7	3.5
	Social security institution		145	72.5
Internet provider	Non		34	17
	Mobile Internet		85	42.5
	WIFI		70	35
	WIFI + mobile Internet		11	5.5
Hernia type	Bilateral inguinal hernia		4	2
	Epigastric hernia		5	2.5
	Femoral hernia		1	0.5
	Inguinal + umbilical hernia		1	0.5
	Inguinal hernia		133	66.5
	Incisional hernia		32	16
	Paraumbilical hernia		21	10.5
	Umbilical hernia		3	1.5
Operations except hernia	No		87	43.5
	Yes		113	56.5
Previous hernia surgery	No		147	73.5
	Yes	No recurrence due to the same hernia	23	11.5
		There is a recurrence due to the same hernia	30	15
Research on the disease	No		89	44.5
	Yes		111	55.5
Research on the surgeon	No		83	41.5
	Yes		117	58.5
Would you go to another surgeon if you could?	No		175	87.5
	Yes		25	12.5
If he/she has other surgery, has he/she been researched?	No		101	50.5
	Yes		17	8.5
	Missing data		82	41
	Total		200	100

the disease and about the surgeons was not statistically significant ($p = 0.850$, $p = 0.517$, respectively; Table 5).

Among the patients who had previous hernia surgery, the rates of conducting research about the disease were statistically similar in those whom the recurrence in the same hernia was observed ($n = 30$, 60%), and those who were operated due to a different hernia ($n = 23$, 52.2%) ($p = 0.569$). Similarly, the rates of conducting surgeon research of the patients in these two groups (66.7%, 56.5%, respectively) were statistically similar ($p = 0.450$). The difference between the patients who used the Internet and those who did not was statistically significant in terms of the rates of researching about the disease and the surgeon ($p < 0.001$, $p = 0.008$; respectively).

A statistically significant relationship was determined between the education level and the person who conducted the research ($p < 0.001$, Table 6). It was observed that as the level of education increased, the patients did the Internet research themselves, while the research was conducted by a relative or neighbor as the level of education of the patients decreased (Table 6).

Table 3 Comparison of internet usage and disease/surgeon research proportions by age groups

			Internet usage		*P*	Research on the disease		*P*	Research on the surgeon		*P*	Total
			No	Yes		No	Yes		No	Yes		
Age	18–40	*n*	0	39	**< 0.001**	9	30	**0.004**	11	28	0.082	39
		%	0%	100%		23.1%	76.9%		28.2%	71.8%		100%
	41–65	*n*	16	99		53	62		48	67		115
		%	13.9%	86.1%		46.1%	53.9%		41.7%	58.3%		100%
	65 +	*n*	18	28		27	19		24	22		46
		%	39.1%	60.9%		58.7%	41.3%		52.2%	47.8%		100%
Total		*n*	34	166		89	111		83	117		200
		%	17%	83%		44.5%	55.5%		41.5%	58.5%		100%

Chi-square test

Bold values are statistically significant

Table 4 The relationship between ASA physical status classification and research situations

			Research on the disease		*P*	Research on the surgeon		Total	*P*
			No	Yes		No	Yes		
ASA Score	ASA I	*n*	37	44	0.799	34	47	81	0.388
		%	45.6%	54.4%		41.9%	58.1%	100%	
	ASA II	*n*	37	51		33	55	88	
		%	42.1%	57.9%		37.5%	62.5%	100%	
	ASA III	*n*	15	16		16	15	31	
		%	48.4%	51.6%		51.6%	48.4%	100%	

Chi-square test

No statistically significant difference was detected between the research status about the disease and about the surgeon and the rates of the answers given to the question of whether they would prefer another surgeon if they had the opportunity ($p = 0.957$, $p = 0.786$, respectively; Table 7).

Of the patients included in the study, 31.5% ($n = 63$) were operated by minimally invasive surgery, and 68.5% ($n = 137$) by the open anterior mesh repair technique. The rates of searching the Internet about the disease and about the surgeon with respect to surgical method were statistically significantly different. It was found that the rates of researching about the disease and about the surgeon on the Internet were significantly higher in those who undergone a minimally invasive surgery ($p < 0.001$, $p < 0.001$, respectively; Table 8).

Discussion

In our study, we investigated the Internet use status of the patients who had elective abdominal wall hernia surgery, as well as their status of conducting research on the Internet about their disease and about the surgeon. In addition, it was also explored whether the patients would prefer a different surgeon if they had the opportunity. The Internet use and doing research on the Internet for the disease significantly decreased with increasing age of the patients. No significant differences were detected between the genders in terms of conducting research about the disease and about the surgeons. The rates of researching the Internet for the disease and the surgeons significantly increased when the level of education increased. The patients living in the city center were observed to have a significantly higher rate of conducting research about the disease and the surgeons than those living in the towns and villages. It was found that the rate of doing Internet research on the disease and the surgeons in the patients undergone the minimally invasive surgery was significantly higher. We observed that the patients' undergoing a hernia surgery or even a recurrence of the same hernia did not affect the researches conducted about the disease and about the surgeons. It was determined that doing Internet research about diseases and surgeons did not affect the preference of the patients for another surgeon if they had the opportunity.

Table 5 The relationship between socio-demographic characteristics and research situations

			Research on the disease		*P*	Research on the surgeon		Total	*P*
			No	Yes		No	Yes		
Gender	Male	*n*	67	79	0.515[a]	62	84	146	0.649[a]
		%	45.9%	54.1%		42.5%	57.5%	100%	
	Female	*n*	22	32		21	33	54	
		%	40.7%	59.3%		38.9%	61.1%	100%	
Education level	Ignorant	*n*	8	9	**< 0.001[a]**	3	14	17	**< 0.001[a]**
		%	47.1%	52.9%		17.6%	82.4%	100%	
	Primary school	*n*	59	35		54	40	94	
		%	62.8%	37.2%		57.4%	42.6%	100%	
	Secondary school	*n*	8	17		13	12	25	
		%	32.0%	68.0%		52.0%	48.0%	100%	
	High school	*n*	10	25		9	26	35	
		%	28.6%	71.4%		25.7%	74.3%	100%	
	College	*n*	4	25		4	25	29	
		%	13.8%	86.2%		13.8%	86.2%	100%	
Living place	Village	*n*	43	26	**0.001[a]**	37	32	69	**0.016[a]**
		%	62.3%	37.7%		53.6%	46.4%	100%	
	District	*n*	21	31		22	30	52	
		%	40.4%	59.6%		42.3%	57.7%	100%	
	City center	*n*	25	54		24	55	79	
		%	31.6%	68.4%		30.4%	69.6%	100%	
Social security	No	*n*	4	1	0.482[b]	3	2	5	0.416[b]
		%	80.0%	20.0%		60.0%	40.0%	100%	
	Green card	*n*	18	25		14	29	43	
		%	41.9%	58.1%		32.6%	67.4%	100%	
	Special insurance	*n*	3	4		2	5	7	
		%	42.9%	57.1%		28.6%	71.4%	100%	
	Social security institution	*n*	64	81		64	81	145	
		%	44.1%	55.9%		44.1%	55.9%	100%	
Internet provider	Non	*n*	25	9	**< 0.001[a]**	21	13	34	0.064[a]
		%	73.5%	26.5%		61.8%	38.2%	100%	
	Mobile Internet	*n*	41	44		31	54	85	
		%	48.2%	51.8%		36.5%	63.5%	100%	
	WIFI	*n*	22	48		26	44	70	
		%	31.4%	68.6%		37.1%	62.9%	100%	
	WIFI + mobile Internet	*n*	1	10		5	6	11	
		%	9.1%	90.9%		45.5%	54.5%	100%	
Internet usage	No	*n*	25	9	**< 0.001[a]**	21	13	34	**0.008[a]**
		%	73,5%	26,5%		61.8%	38.2%	100,0%	
	Yes	*n*	64	102		62	104	166	
		%	38,6%	61,4%		37.3%	62.7%	100,0%	
Previous hernia surgery	No	*n*	66	81	0.850[a]	63	84	147	0.517[a]
		%	44,9%	55,1%		42,9%	57,1%	100%	
	Yes	*n*	23	30		20	33	53	
		%	43,4%	56,6%		37.7%	62.3%	100%	
Total		*n*	89	111		83	117	200	
		%	44,5%	55.5%		41.5%	58.5%	100%	

[a]Chi-square test

[b]Fisher exact test

Bold values are statistically significant

Table 6 The relationship between educational level and the person conducting the research

			Who did the research		Total	*P* value
			Itself	A relative/neighbor		
Education level	Ignorant	*n*	0	14	14	**< 0.001**
		%	0%	100%	100%	
	Primary school	*n*	10	35	45	
		%	22.2%	77.8%	100%	
	Secondary school	*n*	12	8	20	
		%	60%	40%	100%	
	High school	*n*	27	4	31	
		%	87.1%	12.9%	100%	
	College	*n*	25	2	27	
		%	92.6%	7.4%	100%	
Total		*n*	74	63	137	
		%	54%	46%	100%	

Chi-square test

Bold values are statistically significant

Table 7 The relationship between opportunities and research situations

			Would you go to another surgeon if you could?		Total	*P* values
			No	Yes		
Research on the disease	No	*n*	78	11	89	0.957
		%	87.6%	12.4%	100%	
	Yes	*n*	97	14	111	
		%	87.4%	12.6%	100%	
Research on the surgeon	No	*n*	72	11	83	0.786
		%	86.7%	13.3%	100%	
	Yes	*n*	103	14	117	
		%	88%	12%	100%	
Total		*n*	175	25	200	
		%	87.5%	12.5%	100%	

Chi-square test

The study was carried out during the pandemic, however, in the period when the first strict restrictions were lifted and the elective surgery operations resumed. As we did not start the study before the pandemic, and for the time being, it is not known when the pandemic itself or its effects will be ended, we could not have the chance to make comparisons. Nonetheless, the higher rate of internet use of patients in our study compared to previous studies may be due to the increase in the habit of internet use in people locked up in their home with restrictions in the pandemic.

Internet use around the world is ever increasing with the widespread use of mobile devices. According to 2015 data, about 3.6 billion people used the Internet all over the world, and that figure increased by more than 800% in the last eight years. The data of the Turkish Statistical Institute reveal that the Internet usage rate in Turkey in 2015 was 55.9% [5]. Of the patients included in our study, 83% were actively using the Internet, and this rate was higher than the 2015 general Internet usage rate. The fact that the patients in our study have considerably high Internet usage rates from the past data can be explained by wide spreading of home Internet services and mobile phones.

In our study designed as multicenter, we found a statistically significant difference in the rates of conducting the Internet research about the disease and the surgeon with respect to the provinces. When we look at the annual per capita income of these provinces, that value is $12,508 in Ankara, while it is below $5000 in Mus and Tokat. We observed that the rates of conducting research about the disease and the surgeon were significantly higher in patients

Table 8 Comparison of research rates related to the disease and surgeon from the Internet according to the surgical method

			Research on the surgeon		Total	*P* values
			Yes	No		
Method	Minimally invasive surgery	*n*	41	22	63	< 0.001
		%	65.1%	34.9%	100	
	Open anterior mesh repair	*n*	68	69	137	
		%	49.6%	50.4%	100	
Total		*n*	109	91	200	
		%	54.5%	45.5%	100	
			Research on the disease			
			Yes	No		
Method	Minimally invasive surgery	*n*	49	14	63	< 0.001
		%	77.8%	22.2%	100	
	Open anterior mesh repair	*n*	70	67	137	
		%	51.1%	48.9%	100	
Total		*n*	119	81	200	
		%	59.5%	40.5%	100	

Chi-square test

living Ankara than in those living in Tokat and Mus, in parallel to the income level *(*$p < 0.047$, $p < 0.044$, respectively*)*. It has been shown in a recent study that health-related Internet use increased in parallel with income level [6].

As a consequence of the spread of health-related content, as with all topics on the Internet, there have been changes in the traditional exchange of information [7]. In connection to this, more and more patients use the Internet as the source of health information every passing day. However, the rates at which patients in various disease groups conduct research about their disease on the Internet differ. This rate was observed to be 99.3% in gynecological diseases and 51% in orthopedic diseases [8]. We have come across only a few studies in the literature on Internet use of patients who will have elective hernia surgery. One of these studies, consisting of a small series including 30 patients, examined the status of doing research about mesh from the Internet of the patients who will have hernia surgery, and 67% of the patients ($n = 20$) were observed to conduct mesh-related research on the Internet [9]. In another recent study carried out involving 202 patients, the rate of performing research about mesh from the Internet or written sources in patients who will undergo hernia surgery was found to be 27.2% ($n = 56$) [10]. A different study published in 2009, and consisting of a small series of 54 patients, examined the status of conducting Internet research about their disease, which is one of the subjects investigated in our study. However, that study included not only patients who will undergo elective hernia surgery, but also those who will undergo elective cholecystectomy surgery. In the study, it was found that 31% of the patients used the Internet to research about their disease [11]. In our study, on the other hand, 68.5% of 200 patients researched the Internet to obtain information about their disease or about finding a surgeon. The fact that we found a higher rate of conducting Internet research about the disease in our study than the results of the aforementioned study can be explained by wide spreading of the Internet use with elapsed time and the advances in surgical techniques pushing patients to seek information.

We observed in our study that the Internet use and the rate of searching information on the Internet about their disease significantly decreased in the advanced age groups. Many previous studies indicated that the rates of Internet use and searching health-related information in elderly individuals were low [12–14]. In some of the studies conducted to explain this issue, elderly individuals' distrust against the Internet information, and their disappointment in accessing technology have been held accountable for this finding [15, 16].

The large-scale studies comparing genders in terms of the rates of conducting health-related Internet research showed that females preferred it at a higher rate than males [17, 18]. In our study, unlike the literature, the rates of conducting Internet research on hernia and the surgeon were similar in both genders ($p = 0.515$, $p = 0.649$; respectively).

In previous studies, it has been observed that searching for health-related information on the Internet increased in direct proportion to the increase in the level of education [19, 20]. The most important reason for this was indicated to be the increase in health literacy in parallel with increasing level of education [21, 22]. In our study population, the rate

of conducting research on the Internet about hernia and the surgeon significantly increased with the increase in the level of education, consistent with the literature. In the patient groups with low level of education, we observed an increase in conducting Internet research on the disease and the surgeon by their relatives or neighbors instead of themselves. In addition, we found that the relatives of the patients researching the Internet instead of the patients also had a high level of education.

Many studies revealed that patients living in rural areas had a lower rate of doing health-related research on the Internet than patients living in city centers [23–25]. In our study, consistent with the literature, we observed that the Internet researches about hernia disease and about the surgeon preference were conducted significantly higher by the patients living in the city center ($p < 0.001$, $p < 0.0016$, respectively).

We are of the opinion that in parallel with the development of surgical techniques, the need to find a specific surgeon for the patient's disease would gradually increase. The Internet and social media would also be the first source of reference for this need. Many patients do research on the Internet about the physician before getting an appointment [26]. However, a recent study in which Internet searches were conducted about hernia and gallbladder showed that the general surgeons were not listed as the primary service provider in these matters. The study also emphasized that the websites needed regulations so that patients could reach the appropriate physician [27]. In our study, we observed that more than half of the patients who will have hernia surgery conducted research on the Internet to find an appropriate surgeon. In addition, we found that the patients undergoing an operation with minimally invasive technique were more inquisitive in conducting Internet research bout finding surgeons and about their diseases.

One of the remarkable results obtained in our study was that the rates of doing Internet research were similar in patients who had a history of non-hernia surgery, had a history of hernia surgery, and were even operated for recurrence of the same hernia, compared to other patients. We had expected that the rates of doing research about the disease and the surgeon were to be higher especially in the patients with hernia recurrence. However, we could not find a similar study in the literature to discuss this issue with.

We asked the patients whether they would want to prefer a different surgeon if they had the opportunity. Only 12.5% of patients answered this question affirmatively. We observed that doing research about the disease or the surgeon on the Internet did not affect this response. We would have expected this response to be higher in our study which also included the patients from the rural regions of Turkey. However, it should not be overlooked that the fact that the questionnaire questions were directly asked to the patients face-to-face by the surgeons may create pressure on the patients in this regard.

There are some limitations in our study. First, the number of patients included in the study is not large enough to reflect the population. Conducting it with more centers and larger samples will give more reliable results. Another limitation of the study is that the difficulties encountered in doing these researches were not questioned while investigating the rates of conducting research about the disease, and about the surgeon on the Internet. Another limitation of the study is that the quality of the information on the internet was not examined.

Conclusions

In our study, we observed that about two-third of the hernia patients conducted research on the Internet about the diseases and the surgeon. We determined that increasing level of education, young age and living in the city center had a positive effect on conducting Internet research. In addition, we observed that the patients who wanted to undergo a surgery with minimally invasive methods were more active to do research on the Internet about the disease and about finding a surgeon. We believe that with the unstoppable development of technology, the evolution of surgical techniques and people's increasing use of the Internet, the research on the Internet about the diseases and about finding surgeons will increase day by day.

Author contributions CU and HK planned the study, CU, HC and BB collected the data, CU drafted the article, and HK did the revision of the article.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This research was performed in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants.

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