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Original Article

Current practices regarding the management of infrapatellar fat pad during total knee arthroplasty: A survey of orthopedic surgeons

Total diz artroplastisi sırasında infrapatellar yağ yastığının yönetimi ile ilgili güncel uygulamalar: Ortopedi cerrahları arasında bir anket araştırması

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ABSTRACT

Aim: The aim of this study was to evaluate the current practices pertaining to the management of the infrapatellar fat pad (IPFP) during primary total knee arthroplasty (TKA) among orthopedic surgeons in Turkey.

Material and Methods: A web-based survey of orthopedic surgeons registered in the database of the Turkish Orthopedics and Traumatology Association was conducted between June 2020 and July 2020. The survey questionnaire consisted of seven questions pertaining to the current practices regarding management of the IPFP (preservation of IPFP, partial resection, or total resection) during primary TKA.

Results: Of the 1553 registered orthopedic specialists, 266 (17%) completed the questionnaire. A vast majority of orthopedic surgeons (75.2%) claimed that their decision making with regard to the management of IPFP during TKA was not based on evidence ($p < 0.001$).

Conclusion: In a vast majority of respondents, the decision to resect or preserve the IPFP during TKA was not based on scientific reasons. The number of years of experience in the profession and academic position had a significant influence on this decision.

Keywords: Fat pad ; orthopedics; orthopedic surgeon; total knee arthroplasty

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ÖZ

Amaç: Bu çalışmanın amacı Türkiye'deki ortopedi cerrahları arasında primer total diz artroplastisi (TDA) sırasında infrapatellar yağ yastığının (IPFP) yönetimine ilişkin güncel uygulamaları değerlendirmektir.

Gereç ve Yöntemler: Türkiye Ortopedi ve Travmatoloji Derneği veri tabanına kayıtlı ortopedi cerrahlarına yönelik web tabanlı bir anket Haziran 2020 ile Temmuz 2020 arasında gerçekleştirilmiştir. Anket, IPFP'nin yönetimine ilişkin mevcut uygulamalara ilişkin yedi sorudan oluşmaktadır (IPFP'nin korunması, birincil TDA sırasında kısmi rezeksiyon veya tam rezeksiyon).

Bulgular: 1553 kayıtlı ortopedi uzmanından 266'sı (% 17) anketi tamamladı. Ortopedi cerrahlarının büyük çoğunluğu (% 75,2) TDA sırasında IPFP'nin yönetimi ile ilgili karar vermelerinin kanıta dayalı olmadığını iddia etti (p <0,001).

Sonuçlar: Ankete katılanların büyük çoğunluğunda, TKA sırasında IPFP'yi rezeksiyon veya koruma kararı bilimsel nedenlere dayanmıyordu. Meslek ve akademik pozisyondaki yılların sayısı bu karar üzerinde önemli bir etkiye sahipti.

Anahtar Kelimeler: Yağ yastığı; ortopedi; ortopedik cerrah; total diz artroplastisi

Introduction

Total knee arthroplasty (TKA) is the most frequently performed arthroplasty procedure. Advances in TKA have revolutionized the management of knee osteoarthritis; the reported patient satisfaction rates are as high as 90% [1]. The infrapatellar fat pad (IPFP) (also referred to as Hoffa's fat pad) is an intra-capsular structure located between the inferior pole of the patella and the proximal patellar tendon. During TKA, total or partial excision of IPFP is often performed to achieve better surgical exposure of the lateral compartment of the knee joint [2,3]. However, the IPFP is considered as an important anatomical structure with a rich blood supply and nerve fibers. Resection of IPFP is considered as a potential cause of postoperative anterior knee pain, patellar fractures, as well as scarring and shortening of the patellar tendon leading to patella baja [4-6]. The main function of IPFP and the consequences of IPFP excision are not well elucidated. The decision to preserve or resect the IPFP is mainly based on the preference of individual surgeons and the operative needs; the pros and cons of each approach are widely debated [7].

There is no clear consensus on the impact of IPFP resection on the outcomes of TKA. In addition, there are no definitive guidelines on whether to resect or preserve the IPFP during TKA. The aim of this study was to determine the current practices of orthopedic surgeons in Turkey regarding management of the IPFP in patients undergoing primary TKA; in addition we evaluated the reasons for preservation or resection of IPFP in these patients.

Materials and Methods

In this cross-sectional study, we conducted a web-based survey of members of the Turkish Orthopedics and Traumatology Association using the organization's mailing list. The study was conducted in accordance with the principles of the Declaration of Helsinki. All orthopedic surgeons registered in the database were informed about the aims of the survey and provided a link to the online survey form (Google Forms, Google Inc.) via e-mail. The survey questionnaire contained seven questions pertaining to the current practices regarding the management of IPFP during primary TKA. There were multiple response options for each question (Appendix 1).

The professional profile of orthopedic surgeons including years of experience as a surgeon and academic position were assessed. The participants were asked about the number of primary knee arthroplasty operations performed by them in a year. Participants were asked to report whether they prefer complete resection, partial resection, or preservation of IPFP. The reasons for preservation and resection of the IPFP were enquired separately via two multiple choice questions. The participants were also asked whether their decisions are based on any evidence or guidelines.

Statistical analyses

SPSS 15.0 for Windows program was used for statistical analysis. Categorical variables are presented as frequency and percentage. Comparison of rates in independent groups was performed using Chi Squared test. P values of <0.05 were considered indicative of statistical significance.

Results

Out of the 1553 specialist members registered in the Turkish Orthopedics and Traumatology Association mailing list, 266 orthopedic specialists (17%) completed the survey.

The professional profile of respondents and the number of

TKA performed in a year are summarized in Table 1. The vast majority of respondents [200 (75.2%)] claimed that their decision to preserve or resect the IPFP was not based on any guidelines or evidence. Out of the 266 respondents, 144 (54.1%) resorted to partial resection of the IPFP, 74 (27.8%) resorted to total resection of the IPFP, while 32 (12%) preserved or resected the IPFP based on the individual circumstances; 16 (6%) respondents claimed that they routinely preserved the IPFP. Question 6 assessed the reasons for preservation of IPFP. Of the 48 surgeons who preserved the IPFP either routinely or in selected cases, 49.3% cited the following reason for IPFP preservation: 'resection causes complications by disrupting the circulation of patellar tendon and patella'. The detailed analysis of the responses to question 6 is summarized in Table 2.

Table 1. Academic and professional profile of the study population

	n (%)
Years of experience	
1–5 years	107 (40.2%)
6–10 years	59 (22.2%)
11–20 years	50 (18.8%)
≥ 20 years	50 (18.8%)
Academic position	
Orthopedic specialist	195 (73.3%)
Assistant Professor	27 (9.8%)
Associate Professor	24 (11.08%)
Professor	20 (13.3%)
Number of TKA per year	
1–10	49 (18.4%)
11–25	56 (21.1%)
26–50	66 (24.8%)
51–75	38 (14.3%)
76–100	24 (9%)
≥100	33 (12.4%)

TKA, total knee arthroplasty

Table 2. Reasons cited for preservation of IPFP

Answers	n (%)
Habit (clinical experience)	25 (37.3%)
Resection causes anterior knee pain after surgery	27 (40.3%)
Resection causes complications by disrupting the circulation of patellar tendon and patella	33 (49.3%)
Resection reduces the knee range of motion	4 (6%)
Better functional and clinical results when compared with 'resection'	15 (22.4%)

IPFP, infrapatellar fat pad

Question 7 assessed the reason for partial or total resection of IPFP; 79.9% of respondents who resorted to either partial or total resection of IPFP cited 'easier access to the lateral tibial plateau and easier placement of the tibial component' as the reason. The detailed analysis of responses to question 7 is summarized in Table 3.

Table 3. Reasons cited for resection of IPFP

Answers	n (%)
Habit (clinical experience)	96 (39.3%)
It facilitates mobilization of patella	83 (34%)
Easier access to the lateral tibial plateau and easier placement of the tibial component	195 (79.9%)
Resection increases the range of motion	12 (4.9%)
Better functional and clinical results when compared with 'preservation'	23 (9.4%)

IPFP, infrapatellar fat pad

The vast majority of respondents (75.2%) claimed that their decision-making with regard to the management of IPFP during TKA was not based on any evidence ($p < 0.001$).

We found that the experience of the respondents, their job position, or the number of TKA procedures performed per year had no significant effect on the decision making with regard to the management of the IPFP during TKA ($p = 0.460$, $p = 0.975$, and $p = 0.728$, respectively).

We observed a significant association between the experience of respondents and the reasons cited for partial or total resection of IPFP. A significantly higher proportion of respondents with 1–5 years or 6–10 years of experience cited the following reasons for performing partial or total resection (as compared to respondents with 11–20 or ≥20 years of experience): 'habit (clinical experience)' and 'it makes patella easier to deviate' (Table 4).

A significantly greater proportion of Associate Professors and Professors stated that they performed partial or total resection in order to achieve 'better functional and clinical results' as compared to Orthopedic specialists and Assistant Professors (Table 5). There was no significant association of experience or job position with the reasons cited for IPFP preservation ($p < 0.05$). However, the number of TKA performed in a year showed a significant association with the reason cited for IPFP preservation ($p < 0.05$). Orthopedic surgeons who performed less than 75 TKA per year stated that they resorted to IPFP preservation because resection of IPFP causes anterior knee pain after surgery (Table 6). The number of TKA performed annually also showed a significant association with the reasons cited for partial or total resection of IPFP. The proportion of respondents who cited habit or clinical experience as the reason for performing partial or total resection during TKA was lowest among those who performed 51–75 TKA annually (Table 6).

Table 4. Association of experience with the reasons cited for partial or total resection of IPFP

		Experience								
		1–5 years		6–10 years		11–20 years		≥20 years		
		N	%	n	%	n	%	n	%	p
Reason for partial or total resection of the IPFP	Habit (clinical experience)	8	32,0	3	21,4	1	7,7	3	20,0	0,003*
	It facilitates mobilization of patella	53	52,0	21	38,2	11	25,0	11	25.6	<0.001*
	Easier access to the lateral tibial plateau and easier placement of the tibial component	46	45.1	22	40.0	5	11.4	10	23.3	0.679
	Resection increases the range of motion	83	81.4	41	74.5	35	79.5	36	83.7	0.618
	Better functional and clinical results when compared with 'preservation'	6	5.9	1	1.8	2	4.5	3	7.0	0.599

*Pearson's Chi squared test, Bold values indicate statistical significance. IPFP, infrapatellar fat pad

Table 5. Association between academic position and the reason cited for partial or total resection of IPFP

		Academic Position								
		Orthopedic specialist		Assistant Professor		Associate Professor		Professor		
		n	%	n	%	n	%	n	%	p
Reason for 'partial or total resection' of the IPFP	Habit (clinical experience)	75	41,2	11	45,8	5	25,0	5	27,8	0,331
	It facilitates mobilization of patella	68	37,4	8	33,3	3	15,0	4	22,2	0,154
	Easier access to the lateral tibial plateau and easier placement of the tibial component	143	78,6	21	87,5	14	70,0	17	94,4	0,199
	Resection increases range of motion	10	5,5	0	0,0	1	5,0	1	5,6	0,786
	Better functional and clinical results when comparing to 'preservation'	13	7,1	2	8,3	5	25,0	3	16,7	0,038*

*Pearson's Chi squared test, Bold values indicate statistical significance. IPFP, infrapatellar fat pad

Table 6. Association between the number of TKA performed per year and the reasons cited for preservation and resection of the IPFP during TKA

		Number of TKA per year												
		1–10		11–25		26–50		51–75		76–100		≥100		
		n	%	n	%	n	%	n	%	n	%	n	%	p
Reasons for preservation of the IPFP	Habit (clinical experience)	3	25,0	1	11,1	5	33,3	5	55,6	2	22,2	9	69,2	0,057
	Resection to cause anterior knee pain after surgery	8	66,7	6	66,7	4	26,7	5	55,6	2	22,2	2	15,4	0,030*
	Resection to causes complications by disrupting the circulation of patellar tendon and patella	4	33,3	5	55,6	11	73,3	5	55,6	4	44,4	4	30,8	0,241
	Resection reduction of range of motion	0	0,0	1	11,1	1	6,7	0	0,0	0	0,0	2	15,4	0,591
	Better functional and clinical results when comparing to 'resection'	2	16,7	4	44,4	4	26,7	2	22,2	1	11,1	2	15,4	0,631
Reasons for partial or total resection of the IPFP	Habit (clinical experience)	13	28,9	23	43,4	32	53,3	7	20,6	10	43,5	11	37,9	0,028*
	It facilitates mobilization of patella	12	26,7	22	41,5	24	40,0	8	23,5	7	30,4	10	34,5	0,396
	Easier access to the lateral tibial plateau and easier placement of the tibial component	35	77,8	40	75,5	50	83,3	31	91,2	17	73,9	22	75,9	0,451
	Resection increases range of motion	1	2,2	4	7,5	3	5,0	2	5,9	1	4,3	1	3,4	0,925
	Better functional and clinical results when comparing to 'preservation'	3	6,7	5	9,4	7	11,7	5	14,7	2	8,7	1	3,4	0,716

Appendix: Survey questions
1. How many years have you been an orthopedic specialist? o 1-5 years o 6-10 years o 11-20 years o ≥20 years
2. Which of the following best describes your current academic position? o Orthopedic specialist o Assistant Professor o Associate Professor o Professor
3. How many primary total knee arthroplasties do you perform annually? o 1-10 o 11-25 o 26-50 o 51-75 o 76-100 o ≥100
4. Do you make the decision to preserve or resect the infrapatellar fat pad while making a total knee arthroplasty, according to any guidelines or evidence? o Yes (I do it according to a guideline or evidence) o No (I don't do it according to a guideline or evidence)
5. Which of the following procedures do you apply to the infrapatellar fat pad (Hoffa's fat pad) when performing a total knee arthroplasty? o Routinely preservation (if your answer is yes, please answer the 6th question) o Routinely partially resection (if your answer is yes, please answer 7th question) o Routinely total resection in total (if your answer is yes, please answer the 7th question) o Sometimes preservation and sometimes resection (if your answer is yes, please answer both the 6th and 7th questions)
6. What is the reason for you to 'preserve' the infrapatellar fat pad? (you can select multiple options) o Habit (clinical experience) o Resection causes anterior knee pain after surgery o Resection causes complications by disrupting the circulation of patellar tendon and patella o Resection reduces of range of motion o Preservation provides better functional and clinical results when compared to resection
7. What is the reason for you to 'partially or totally resect' the infrapatellar fat pad? (you can select multiple options) o Habit (clinical experience) o It facilitates mobilization of patella o Easier access to the lateral tibial plateau and easier placement of the tibial component o Resection increases range of motion o Resection provides better functional and clinical results when compared to preservation

Discussion

Prior to this study, we presumed that the experience and job position would be key determinants of the decision to preserve the IPFP during TKA. However, we found no significant effect of these factors on the decision. Nonetheless, we found that the experience and job position significantly affected the decision to perform partial or total resection of IPFP. On the contrary, the reasons cited for preserving the IPFP were not affected by the experience (working years in the profession) and the job position; however, the number of TKA performed annually showed a significant correlation with the reason cited for IPFP preservation.

In particular, we observed that orthopedic surgeons working as academicians attributed their decision to preserve or resect IPFP to a scientific reason. A greater proportion of respondents with 1–10 years of experience in the profession cited habit and easier patellar deviation as the reason for performing partial or total resection; we believe that this phenomenon is attributable to the lack of definnitive guidelines. Owing to the lack of consensus in this regard and the absence of guidelines, this issue is largely unaddressed during classical specialty training. Similarly, this topic is not addressed in the courses and professional forums. However, orthopedic surgeons who continue their professional life as an academician have greater access to contemporary literature; therefore, they tend to at least advocate an evidence-based approach.

In a cadaveric study, excision of the IPFP was found to alter the patellar position, patellar tendon length, and the range of motion of knee. This ex vivo study showed that IPFP excision decreases the tibial external rotation relative to the femur, causes a significant medial translation of the patella, and reduces the retropatellar pressure [8]. Complete excision of the IPFP during TKA may cause injury to the lateral genicular artery and damage the vascular supply of patellar tendon, thus causing tendon scarring [9]. In some previous studies, excision of the IPFP was found to cause shortening of the patellar tendon, increase the incidence of anterior knee pain, and reduce the extent of flexion; however, other studies found no significant difference in terms of patellar tendon length, anterior knee pain, or range of motion when comparing IPFP excision with IPFP preservation [2, 3, 9-16]. A recent systematic review aimed to clarify the influence of IPFP resection or preservation on outcomes of primary TKA; the results of the review were inconclusive vis-à-vis the superiority of one surgical technique over the other [17]. In another similar systematic review, IPFP resection showed a trend towards a decrease in patellar tendon length as well as a higher incidence of anterior knee pain in the medium-term. However, the authors emphasized that the available evidence regarding resection or preservation of the IPFP is not conclusive [18].

The 2004 National Joint Registry report for England and Wales showed total or partial removal of IPFP in 86% of patients undergoing primary TKAs [19]. In a survey of 173 orthopedic surgeons in the UK, 9.83% of respondents preferred total preservation of the IPFP, 23.12% preferred total resection, and 62.4% favored partial resection. Furthermore, only 23% of respondents were aware of any guidelines or evidence to support their surgical decision [20].

In our study, 82% of the respondents performed total or partial resection of IPFP. These results are similar to the 2004 UK and Wales National Joint Registry report [19]. Similarly, in a survey of orthopedic surgeons in England conducted by van Duren et al. [20] (n=173), 9.83% of the respondents stated that they completely preserve the IPFP. In addition, only 23% of the respondents based their opinions on any guideline or evidence. In our study, 6% of respondents completely preserved the IPFP. In addition, only 24.8% respondents claimed that their opinion about preservation of IPFP was based on any scientific evidence.

Conclusion

In a vast majority of respondents, the decision-making about resection or preservation of IPFP during TKA was not based on scientific reasons. The number of years of experience in the profession and the academic position of the respondents were key determinants of this decision. We believe that continuing education of orthopedic surgeons is required to facilitate informed decision about management of IPFP. Further research on this subject will contribute to the development of definitive guidelines in future.

Declaration of conflict of interest

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