

Review Article

Impact of Obesity on the Results of Arthroscopic Surgery of the Lower Extremity

Ersin Kuyucu* and Mehmet Erdil

Department of Orthopedics and Traumatology, Istanbul Medipol University, Turkey

*Corresponding author

Ersin Kuyucu, Department of Orthopedics and Traumatology, European TEM göztepeçik, no: 1 Bağcılar, Istanbul Medipol University, Turkey, Email: ersinkuyucu@yahoo.com.tr

Submitted: 08 February 2016

Accepted: 12 March 2016

Published: 14 March 2016

Copyright

© 2016 Kuyucu et al.

OPEN ACCESS

Keywords

- Arthroscopy
- Complication

Abstract

According to the reports of the World Health Organization, obesity is an epidemic health problem increasing day by day. Its effects on the human body also include the muscle & skeleton system, and due to the excessive load on the joints, it also leads to defects in the hip, the knee, and the ankle joints. The arthroscopic surgery results and the functional recovery are affected in a negative way. In this review, we have evaluated 15 lower extremity arthroscopic surgeries, which included 5536 patients. Our purpose is to examine the results of lower extremity arthroscopy conducted on obese patients, and the effects of these findings on the surgical survey. Orthopedic surgeons should keep this issue in mind to ensure it does adversely affect functional outcomes.

INTRODUCTION

According to the USA data, 35.1% of the population of the USA who are over the age of 20 are obese (BMI ≥ 30 kg/m²), and 69% is overweight (BMI ≥ 25 kg/m²) [1]. According to the World Health Organization (WHO) 2008 data, 10% of the adult men in the world, and 14% of the women are obese (BMI ≥ 30 kg/m²), and the total number of obese people is more than half billion [2]. Obesity causes many health problems as well as influencing the success of the surgery in a negative way [3].

Examining the knee with laparoscopic endoscope was first performed in 1912 by Danish surgeon Severin Nordentoft [4]. Japanese surgeon Kenji Takagi, who is known as “the Father of Arthroscopy” introduced knee surgeries with arthroscopy [4]. Arthroscopic surgery became popular in 1990s, and since then it has become one of the most frequently applied procedures of orthopedics. Arthroscopy is used mostly in knee, ankle, shoulder, wrist and many other joint surgeries [5].

Many surgeries conducted so far have released the results of the ankle, hip and knee arthroscopies in obese patients. Also, there are various studies focusing on the effects of obesity on these surgeries. The aim of this review is examining the results of the low extremity arthroscopy results and the impact of arthroscopy on the surgical survey in obese patients.

The Study

In the literature scan, it has become obvious that there are various studies examining the interaction between the functional results of arthroscopy in lower extremities and obesity. The

original articles that have been published in English constitute the selection criteria. The arthroscopic studies that do not include obesity, the data that do not include the original data, arthroscopic studies for those below the age of 14 were accepted as the exclusion criteria. Letters to the editor, reviews and meta-analyses were also excluded.

Literature scan was made according to the “PubMed” and “Web of Science” data between the dates May 1995, and May, 2015. The scanning was made as follows: (obesity OR overweight OR BMI > 30) and (knee arthroscopy OR hip arthroscopy OR ankle arthroscopic OR cartilage OR meniscus rupture). 602 studies were found in the Pubmed, and 467 in the Web of Science. The full text studies were examined one by one in a systemic way, and the type of each study, the surgeries, and the number of the cases, demographic characteristics, Body Mass Indices (BMI) and the follow-up results were examined.

15 cases that met the inclusion and exclusion criteria were evaluated. Eight cross-sectional, seven cohort studies, which included 5536 cases in which the effects of obesity on surgical results were examined, were assessed (Table 1). 10 of the studies included knee, 3 included hip, and 2 included ankle arthroscopies.

Obesity and knee Arthroscopy

10 [6-15] of the studies evaluated the knee arthroscopy and obesity relation. 6 [6,7,9,12,13,15] of these covered arthroscopic meniscus surgeries, 2 [10,11] of them covered arthroscopic osteoarthritis surgeries, and 2 [8,14] covered anterior cruciate ligament and ligament surgeries.

Table 1: List of reviewed articles.

Reference	Study type	Sample size	Mean age	BMI	Surgery type	Joint	Outcome	Conclusion
Gregory F(6)	CS	M: 262 F:282 T:544	M:59.9 +-7.8 F:61.4+-7.8	M:29.9+ 5.3 F:31.2+6.8	Meniscal surgery cases	KNEE	A relationship was identified between BMI and meniscal surgery	Increasing BMI is associated with meniscal tears
Erdil M (7) 7 7	LS	M:667 F: 423 Total: 1090	43.4	>30 ; 286	Meniscal surgery	KNEE	Early complications was significantly higher in obesity group	Patients with moderate or significant obesity have inferior short – term outcomes.
Kluczynski M.A (8)	CS	M:312 F:229 Total: 541	25.9 ± 11.3	> 25; 233	ACL reconstruction	KNEE	Older age predicted more chondral injuries. Male sex predicted more lateral meniscal tears. Obesity predicted fewer medial meniscal tears and more chondral injuries.	Male patients had more lateral and medial meniscectomies, obesity was associated with more chondral injuries.
H. Byoung-yoon (9)	CS	M:143 F:333 Total: 476	56.7(17-78)	26.7 ± 3.4 24.9 ± 3.1	Medial meniscus posterior root tear (MMPRT)arthroscopic surgery	KNEE	BMI more than 30 kg / m ² with a 4.9 fold increase.	This study demonstrates that advancing age, female sex, higher BMI, increased Kellgren Lawrence grade ,varus mechanical axis angle, lower sports activity level are all associated with MMPRT.
G.Spahn (10) 10	CS	M:71 F:85 Total:156	51.6 ± 8.7	28.1 ± 3.5	Arthroscopy in Medial compartment osteoarthritis	KNEE	In patients with a poor result, BMI was 29.1 ± 3.4 kg /m ²	A history of OA for more than 2 years, obesity, smoking , as well as joint space narrowing of less 5 mm and tibial osteophytes were associated with a poor outcome.
M. Ciccotti 12	LS	1010	53.7 ± 3.4	BMI >30 kg/m ² :491 (48.6%)	Arthroscopy for meniscal pathologies	KNEE	There was a relatively low prevalence of lateral compartment changes noted in this study overall, even in obese patients.	Risk factors that correlate with articular cartilage damage include increasing age , elevated BMI, medial compartment pathology and knee contractures.

E.E.Berg (13)	LS	10	41 (16 to 52)	Morbid obesity	Knee joint arthroscopy	KNEE	Obesity is a health risk that causes a proclivity for surgical complications and increased morbidity.	Morbidly obese patients present several technical problems for the arthroscopiest
T.J. Midley(14)	LS	126 knees (123 patient)	25.86:nonobese 28.1:obese	28.8 kg/m ²	Surgically treated multiligamentous injuries	KNEE	Every 1-unit increase in BMI ,complication rates increased by 9.2%.	Increased body mass of patients remains a risk factor for low energy knee dislocations
A.P. Eskelinen (15)	LS	98 knees(88 male)	20.1	23.46 ± 3.06	Arthroscopily treated young male adults	KNEE	In patients with deep articular cartilage lesions both the median BMI and mean body mass were significantly higher than in patients with superficial lesions	Whatever the etiology of the primary cartilage lesion, the same risk factor, overweight , may predispose young patients to more severe cartilage injuries.
Gupta A. (16)	CS	680	34.78:nonobese(562) class -I :44.02 class-II:39.33	23.63:nonobese 33.8:class-I 36.07:class-II	Arthroscopy	HIP	There was a higher percentage of labral repair and capsular plicationsin the non obese group. Lower rate of revision hip arthroscopy in the non -obese group.	Our study demonstrated that obese patients started with lower absolute scores preoperatively and ended with lower overall absolute postoperative scores.
J.A. Collins (17)	CS	39, 21:obes	38 ± 11.7(nonobese) 41 ± 10.8(obese)	22.4 ± 2.2 kg/m ² nonobese, 33.4 ± 4.2 kg/ m ² obese.	Arthroscopy	HIP	Clinical outcomes are significantly improved from baseline after hip arthroscopy in both obes and nonobese patients	Obese patients are at a significantly increased risk of postoperative complications such as DVTs and worsened hip pain.
Gupta A. (18)	CS	62:(obese) 124 :nonobese	41.9(17-65) nonobese 42(17-61)obese	22.7 kg /m ² : nonobese 33.1 kg /m ² : obese	Arthroscopy	HIP	Rate for conversion to total hip arthroplasty or revision hip arthroscopy was almost twice that in the obese group.	Obese patients may not have similar absolute scores after hip arthroscopy
J. Christopher (19)	LS	33	42(13-65)	31.3 kg /m ² : obese	Arthroscopy	ANKLE	Obese patients were more likely to be rated with fair or poor outcomes	Nonobese patients and patients receiving postoperative physical therapy had significantly better outcomes
M.M. Kivi (20)	LS	36	36.48 ± 6.43	29.18 ± 3.99	Arthroscopy of anterolateral impingement	ANKLE	Only the chondralleson had a significant mean value when strafied by the BMI.	Obese patients have treatment outcomes similar to nonobese patients.

In the case-control study which examined the relation between the BMI and meniscus ruptures, 544 cases were included [6]. The researchers emphasized that the meniscus cases occurred because they were more subject to torsional loads and stretches due to obesity and were torn more, and the healing was influenced negatively due to drip-feed in the veins being less because of obesity [6].

In the retrospective study in which over 1000 patients were included [7], it was reported that the BMI being higher than 26 (BMI>26) influenced the short-term results after partial meniscectomy. In another study examining the BMI and meniscus ruptures [9], it was reported that obesity was a risk factor in rupture etio pathogenesis independent from the lifestyle and race.

In other studies evaluating the BMI and joint cartilage [8,12,15] it was emphasized that the BMI being high led to a more severe cartilage damage and a more comorbid situation. In addition, it was reported that this cartilage damage was found in outer bridge grade 3-4 lesions medial compartment -as stated in the series with 1010 cases (12)-; and chondral damage due to narrowing of joint in the lateral compartment being observed more in people who were not obese [12].

It was also reported in the literature that even in injuries with lower energy in patients with higher BMI, there was the risk of multi-ligament injury. Moreover, the rates of neurovascular injury and postoperative complications were high [14].

In a series of 156 cases which examined the BMI and osteoarthritic changes [10] it was reported that overweight plantar excessive load prepared the ground for osteoarthritis. The proposed mechanisms were damaging the functions by loading excessive weight on the muscles, loading excessive weight on the joint cartilage and leading to walking disorders.

Obesity and Hip Arthroscopy

3 [16-18] of the studies examined the effects of obesity on hip arthroscopy. It was demonstrated in the literature that the need for total hip arthroscopy was lower in further levels in people who were not obese. The revision arthroscopy rates were reported to be more frequent in obese people [16,18]. Moreover, higher labral fixation and capsular application rates were reported in persons who were not obese [18].

In a series of 39 cases in which the functions after postoperative hip arthroscopy in people who were obese and who were not obese were evaluated [17]. It was reported that there were no statistically significant differences between the modified Harris and non-arthritis hip scores. It was also reported that the complications such as deep venous thrombosis, wound infection, and an increase in pain were higher in obese patients [17].

Obesity and Ankle Arthroscopy

2 [19,20] of the studies examined the effects of obesity on ankle arthroscopy. It was reported that obesity influenced the results in a negative way just like it is the case in knee and hip arthroscopy [19]. In a series of 36 cases with ankle arthroscopy due to anterolateral impingement it was reported that -contrary to

the results reported in the literature- there were not a significant difference between the outcome of those who were obese and those who weren't [20].

DISCUSSION

According to the reports of the WHO, obesity has become an epidemic health problem increasing day by day [21]. Orthopedists have to know the effects of obesity on orthopedic surgery. With this review, our purpose is to evaluate the impact of obesity on arthroscopic lower extremity surgery, which is one of the most frequently applied surgical procedures in orthopedics.

Obesity is influential in the wear and tear of the meniscus by causing excessive tension and torque in the knee [6,22]. Obesity and the biomechanical imbalance as well as aging create cellular surface changes and vascular insufficiency, and accelerate the degenerative process. In consequence meniscus wear & tear and the healing processes of meniscus is affected [6,23]. Obesity does not allow meniscus movement in agreement with the proper biomechanics in the joint and increases the wear [12]. Also, arthroscopy is extremely difficult in obese patients because of reasons like the difficulty in palpating anatomical landmarks, the need for accessory portal, the support for the legs, tourniquet, and similar standard equipment being insufficient for the obese patients [14]. Our review emphasizes the importance of the issues related with obesity causing cartilage and meniscus damage and the issues stemming from surgical challenges.

The ankle being under constant excessive weight stress leads to inflammatory response in the bone surrounding the ankle, synovium in the cartilage and the capsule and, therefore, causes constant pain in the ankle; and this process leads to synovitis and permanent cartilage damage [24]. It was reported that the obese patients and non-obese patients in a series 36 cases yielded similar postoperative results controversial to the literature [20]. In this study, although we have reported the negative effects of obesity on the ankle and hip; in order to evaluate the effects of obesity after the arthroscopy on the healing of the patient, future studies including more cases and with long-term follow-up are warranted.

1 kg weight in our body means a load of 4 kg in our knees in our daily lives. During sports, while kneeling and standing up, climbing stairs, this load reaches up to 7-10 kg. 157 and 146 Nm torque values are reached for the knee and ankle, respectively [25]. Complications such as joint swelling, stiffness and hemarthrosis are frequently observed after arthroscopic surgeries [14,17,19].

In conclusion, it must be kept in mind by the orthopedic surgeons that the obesity in orthopedic surgery may affect the results. Obese patients must be informed that the high success rate of arthroscopic surgery may be decreased because of obesity.

REFERENCES

1. Charles J Rothwell. United States 2014. Ambulatory care. 225-276.
2. World health statistics 2008. Part-2 global health indicators. 35-104.
3. Fabricant PD, Rosenberger PH, Jokl P, Ickovics JR. Predictors of short-term recovery differs from those of long-term outcome after arthroscopic partial meniscectomy. *Arthroscopy*. 2008; 24: 769-778.

4. Doral MN, Tandoğan RN, Mann G, Verdonk R. Sports Injuries. The past and the future of arthroscopy. 2012; 5-13.
5. Robert Treuting. Minimally invasive orthopaedic surgery. The Ochsner Journal. 2000; 2: 158-163.
6. Ford GM, Hegmann KT, White GL, Holmes EB. Associations of body mass index with meniscal tears. Am J Prev Med. 2005; 28: 364-368.
7. Erdil M, Bilsel K, Sungur M, Dikmen G, Tuncer N, Polat G, et al. Does obesity negatively affect the functional results of arthroscopic partial meniscectomy? A retrospective cohort study. Arthroscopy. 2013; 29: 232-237.
8. Kluczynski MA, Marzo JM, Bisson LJ. Factors associated with meniscal tears and chondral lesions in patients undergoing anterior cruciate ligament reconstruction. AM J Sports Med. 2013; 41: 2759-65.
9. Hwang BY, Kim SJ, Lee SW, Lee HE, Lee CK, Hunter DJ, et al. Risk factors for medial meniscus posterior root tear. Am J Sports Med. 2012; 40: 1606-1610.
10. Spahn G, Mückley T, Kahl E, Hofmann GO. Factors affecting the outcome of arthroscopy in medial-compartment osteoarthritis of the knee. Arthroscopy. 2006; 22: 1233-1240.
11. Coggon D, Reading I, Croft P, McLaren M, Barrett D, Cooper C. Knee osteoarthritis and obesity. Int J Obes Relat Metab Disord. 2001; 25: 622-627.
12. Ciccotti MC, Kraeutler MJ, Austin LS, Rangavajjula A, Zmistowski B, Cohen SB, et al. The prevalence of articular cartilage changes in the knee joint in patients undergoing arthroscopy for meniscal pathology. Arthroscopy. 2012; 28: 1437-1444.
13. Berg EE. Knee joint arthroscopy in the morbidly obese. Arthroscopy. 1998; 14: 321-324.
14. Ridley TJ, Cook S, Bollier M, McCarthy M, Gao Y, Wolf B, et al. Effect of body mass index on patients with multiligamentous knee injuries. Arthroscopy. 2014; 30: 1447-1452.
15. Eskelinen AP, Visuri T, Larni HM, Ritsilä V. Primary cartilage lesions of the knee joint in young male adults. Overweight as a predisposing factor. An arthroscopic study. Scand J Surg. 2004; 93: 229-233.
16. Gupta A, Redmond JM, Hammarstedt JE, Lindner D, Stake CE, Domb BG. Does obesity affect outcomes after hip arthroscopy? A cohort analysis. J Bone Joint Surg Am. 2015; 97: 16-23.
17. Collins JA, Beutel BG, Garofolo G, Youm T. Correlation of obesity with patient-reported outcomes and complications after hip arthroscopy. Arthroscopy. 2015; 31: 57-62.
18. Gupta A, Redmond JM, Hammarstedt JE, Stake CE, Domb BG. Does obesity affect outcomes in hip arthroscopy? A matched-pair controlled study with minimum 2-year follow-up. Am J Sports Med. 2015; 43: 965-971.
19. Japour C, Vohra P, Giorgini R, Sobel E. Ankle arthroscopy: follow-up study of 33 ankles--effect of physical therapy and obesity. J Foot Ankle Surg. 1996; 35: 199-209.
20. Mardani-Kivi M, Mirbolook A, Karimi Mobarakeh M, Khajeh Jahromi S, Hassanzadeh R. Effect of obesity on arthroscopic treatment of anterolateral impingement syndrome of the ankle. J Foot Ankle Surg. 2015; 54: 13-16.
21. [No authors listed]. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser. 2000; 894: 1-253.
22. Kurosawa H, Fukubayashi T, Nakajima H. Load-bearing mode of the knee joint: physical behavior of the knee joint with or without menisci. Clin Orthop Relat Res. 1980; 283-290.
23. Renström P, Johnson RJ. Anatomy and biomechanics of the menisci. Clin Sports Med. 1990; 9: 523-538.
24. Magnuson PB. Joint debridement. Surgical treatment of degenerative arthritis. Surg Gynecol. 73: 1941; 1-9.
25. Serbest K, Açıllı M, Eldoğan O. Biomechanical effects of daily physical activities on the lower limb. Acta Orthop Traumatol Turc. 2015; 49: 85-90.

Cite this article

Kuyucu E, Erdil M (2016) Impact of Obesity on the Results of Arthroscopic Surgery of the Lower Extremity. *Ann Orthop Rheumatol* 4(1): 1063.