Observational Study

Medicine

OPEN

Epidemiology of lateral and medial epicondylitis in South Korea

A nationwide population-based study

Bong Gun Lee, MD, PhD[a], Young Seok Lee, MD[b], Chang-Hun Lee, MD, PhD[a], Wan-Sun Choi, MD, PhD[c], Seung Hun Baek, MD[b], Young-Hoon Jo, MD, PhD[b,*]

Abstract

Few studies have reported the epidemiology of lateral epicondylitis (LE) and medial epicondylitis (ME) in nationwide databases. This study aimed to investigate the epidemiology of LE and ME in South Korea. We analyzed data from the nationwide database of the Korean Health Insurance Review and Assessment Service from 2013 to 2017. We investigated the incidence, prevalence, and surgical trends in patients with LE or ME. Between 2013 and 2017, we identified 2813,431 and 836,610 patients with LE and ME, respectively. LE and ME were more frequently diagnosed in women than in men. During the study period, the mean annual age-adjusted incidence rates of LE and ME were 9.7 per 1000 people and 2.9 per 1000 people, respectively. The incidence of LE did not change significantly during the study period, but the prevalence rate increased significantly. Conversely, the incidence and prevalence rates of ME have significantly increased. Furthermore, 0.8% and 1.0% of patients with LE and ME, respectively, required surgical treatment, showing an annual increase in the number of surgical treatments for LE and ME, respectively. The proportion of arthroscopic surgeries performed for LE did not significantly change during the study period. The prevalence of LE and ME has increased in South Korea. Consequently, the number of surgeries performed annually for LE and ME has increased.

Abbreviations: HIRA = Health Insurance Review and Assessment Service, LE = lateral epicondylitis, ME = Medical epicondylitis.

Keywords: epidemiology, incidence, lateral epicondylitis, medial epicondylitis, prevalence, surgery

1. Introduction

Epicondylitis is one of the most prevalent upper extremity diseases; lateral epicondylitis (LE) is commonly referred to as tennis elbow, whereas medial epicondylitis (ME) is called golfer's elbow. Epicondylitis causes significant pain and functional impairment, and reduces productivity in the working population.[1] Epicondylitis can be treated using nonsurgical methods, and spontaneous resolution is generally expected within 12 months.[2] However, in cases of chronic recalcitrant epicondylitis that does not respond to conservative treatment, surgical intervention may be necessary.[3]

Most data on the incidence and prevalence of epicondylitis come from studies of individual practices rather than from more comprehensive population-based studies. Therefore, the actual incidence and prevalence of this condition remain largely unknown. In addition, race has been reported as a risk factor for the incidence of LE and ME[4]; however, only a few studies on the incidence and prevalence of LE or ME in Asians are available. Furthermore, surgical indications for epicondylitis, such as symptom duration > 6 months or persistent severe pain despite conservative management, remain ambiguous. These ambiguous indications, along with the surgical preferences of healthcare providers who treat patients with epicondylitis, lead to significant variations in surgical rates across hospitals.[2,5,6] Moreover, only a few studies have reported the surgical rates of LE and ME using nationwide data.[7]

Thus, in this study, we aimed to investigate the epidemiology, including the incidence, prevalence, and surgical rates of LE and ME in South Korea, by analyzing nationwide data acquired from the Korean Health Insurance Review and Assessment Service (HIRA) database.

2. Methods

2.1. Data source

This cross-sectional epidemiological study analyzed nationwide data from the HIRA database. In South Korea, National Health Insurance covers 100% of the population, including

BGL and YSL contributed equally to this work.

The authors have no funding or conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

[a] Department of Orthopaedic Surgery, Hanyang University College of Medicine, Seoul, Republic of Korea, [b] Department of Orthopaedic Surgery, Hanyang University Guri Hospital, Guri, Republic of Korea, [c] Department of Orthopaedic Surgery, Ajou University School of Medicine, Yeongtong-gu, Suwon, Republic of Korea.

** Correspondence: Young-Hoon Jo, Department of Orthopaedic Surgery, Hanyang University Guri Hospital, 153 Gyeongchun-ro, Guri-si, Guri 11923, Republic of Korea (e-mail: darkpac@hanmail.net).*

How to cite this article: Lee BG, Lee YS, Lee C-H, Choi W-S, Baek SH, Jo Y-H. Epidemiology of lateral and medial epicondylitis in South Korea: A nationwide population-based study. Medicine 2025;104:9(e41588).

Received: 23 December 2023 / Received in final form: 30 January 2025 / Accepted: 31 January 2025

http://dx.doi.org/10.1097/MD.0000000000041588

97% for health insurance and 3% for medical aid.[8] All healthcare providers submit claims data for inpatient and outpatient management, including diagnostic codes (classified according to the International Classification of Diseases, 10th revision), procedure codes, and demographic information, to the HIRA to request reimbursement for medical costs from the National Health Insurance Service. Hence, the medical data of almost all outpatients and hospitalized patients in South Korea were prospectively recorded in the HIRA database.

2.2. Data collection

We surveyed patients of all ages who visited medical institutions for LE or ME in South Korea between 2013 and 2017. Distinct International Classification of Diseases, 10th revision codes for LE (M771) and ME (M770) were used to identify patients with LE or ME, respectively (Table 1). We examined patient data to identify the year of diagnosis, age, sex, and whether the patient had undergone surgery. The year of diagnosis was defined as the year in which the diagnostic code first appeared during the study. The HIRA data for 2012 were required to ensure that the observed patients with epicondylitis were not duplicate entries of diseases that had occurred before 2013. When the operation codes were entered for the M771 or M770 codes, relevant patients were determined to have undergone surgery. The operation codes for the patients with LE and ME are listed in Table 1.

Using the acquired data, we measured the incidence, prevalence, and surgical trends in patients with LE and ME. The annual incidence was determined as the number of patients assigned to the M771 or M770 code for the first time during the study period. The number of patients with M771 or M770 codes during the respective years and who visited a medical facility at least once was considered the annual prevalence. We excluded patients with LE or ME codes before 2013 from the incidence rate but included them in the prevalence rate if they met the criteria. The surgical trends were examined by investigating the number of surgeries performed annually. Specifically, for LE surgeries, the annual arthroscopic surgery rate was analyzed using arthroscopic equipment codes (Table 1). Additionally, patients with concurrent codes for LE and ME were defined as those with both conditions simultaneously and their epidemiology was investigated.

2.3. Statistical analysis

The estimated year-, age-, and sex-specific populations were obtained from the Statistics Korea Database (http://www.kosis.kr). We calculated the age- and sex-adjusted incidence and prevalence rates per 1000 persons with LE and ME, using the 2010 United States population as the standard population.[9] The annual percentage changes in the age-adjusted incidence and prevalence rates from 2013 to 2017 were calculated using joinpoint regression analysis (Joinpoint Regression Program, version 4.3.1.0; National Cancer Institute, Bethesda, MD).[10] For LE, variation in the proportion of open and arthroscopic surgery over the years was analyzed using the Cochran-Armitage trend test. The chi-square test or Fisher exact test was used to compare dichotomous data. SAS statistical software version 9.13 (SAS Institute, Cary, NC) was used for the statistical analysis. Statistical significance was set at $P < .05$.

2.4. Ethics statement

The study protocol was exempted from review by the Institutional Review Board of Hanyang University Hospital (HYUH 2019-06-011) following the exemption criteria. The requirement for informed consent was waived because this study used only publicly available data.

3. Results

Between 2013 and 2017, 2813,431 patients with LE and 836,610 patients with ME were identified in South Korea (Table 2). The LE/ME ratio was 3.4:1. Both LE and ME are diagnosed more frequently in females than in males. In both the LE and ME groups, the number of patients in the 50- to 59-year age group was the highest, followed by the 40- to 49-year and 60- to 69-year age groups.

During the study period, the mean annual age-adjusted incidence rates of LE and ME were 9.7 per 1000 people and 2.9 per 1000 people, respectively (Fig. 1). The incidence rates were higher in females than in males in both groups. The mean annual incidence rates by age group were highest in the 50- to 59-year age group for both LE (23.3/1000) and ME (7.5/1000), followed by the 40- to 49-year age group for LE (19.9/1000), and the 60- to 69-year age group for ME (6.0/1000) (Fig. 2A and B). The mean annual age-adjusted prevalence rates were 14.4 per 1000 people for LE and 4.2 per 1000 people for ME.

The age-adjusted incidence rate per 1000 people with LE decreased from 10.2 in 2013 to 9.5 in 2017; however, this difference was not significant ($P = .08$) (Fig. 3). Conversely, the age-adjusted incidence rate per 1000 people with ME significantly increased from 2.8 in 2013 to 3.1 in 2017 ($P = .01$). The age-adjusted prevalence rate per 1000 people with LE significantly increased from 13.5 in 2013 to 15.5 in 2017 ($P < .001$) (Fig. 4). Similarly, the age-adjusted prevalence rate per 1000 people with ME significantly increased from 3.7 in 2013 to 4.8 in 2017 ($P < .001$).

During the study period, 0.8% of the patients with LE and 1.0% of the patients with ME required surgical treatment. The demographic characteristics of patients who underwent surgery are summarized in Table 3. In women, the surgery rates for LE and ME were 0.9% and 1.3%, respectively, which were significantly higher than those in men (0.7% and 0.9%) (all $P < .001$). Furthermore, the proportion of patients who underwent surgery was highest among those in their 50s. The number of surgeries for LE increased from 3730 in 2013 to 5572 in 2017, and the number of surgeries for ME increased from 1365 in 2013 to 1974 in 2017 (Fig. 5). No significant changes were observed in the rates of open versus arthroscopic surgery in patients with LE ($P = .30$; Fig. 6). Approximately 30% of the patients with LE who required surgical treatment underwent arthroscopic surgery.

Additionally, 222,196 patients had concurrent LE and ME during the study period (Table 2). The mean annual age-adjusted incidence and prevalence rates of concurrent LE and ME were 0.8 per 1000 people and 0.9 per 1000 people, respectively. Among the patients with concurrent LE and ME, 1.1% underwent surgical treatment, indicating a higher proportion of surgical treatment than in patients with isolated LE or ME.

Table 1

Codes used in the analysis.

Code	Description
M771	Lateral epicondylitis of elbow
M770	Medial epicondylitis of elbow
N0931	Reconstruction of Tendon and ligament—simple
N0932	Reconstruction of Tendon and ligament—complex
N0703	Excision of joint (including synovectomy)
N0708	Excision of joint (including synovectomy)—complex
N0941	Tenolysis
N0942	Tenolysis—simple
N0031003	Arthroscopic device code

Table 2

Demographic results.

Variable	Lateral epicondylitis	Medial epicondylitis	Lateral epicondylitis + medial epicondylitis
Number	2813,431	836,610	222,196
Sex, n (%)			
Male	1290,627 (45.9%)	376,770 (45.0%)	89,629 (40.3%)
Female	1522,804 (54.1%)	459,850 (55.0%)	132,567 (59.7%)
Age, mean ± SD, year	51.0 ± 11.9	51.5 ± 12.3	51.5 ± 11.0
Age group, n (%)			
<20 yr	31,240 (1.1%)	15,183 (1.8%)	2189 (1.0%)
20–29	79,672 (2.8%)	29,504 (3.5%)	5583 (2.5%)
30–39	278,255 (9.9%)	70,934 (8.5%)	16,955 (7.6%)
40–49	863,928 (30.7%)	215,156 (25.7%)	64,311 (28.9%)
50–59	948,793 (33.7%)	306,382 (36.6%)	87,354 (39.3%)
60–69	432,338 (15.4%)	146,064 (17.5%)	34,570 (15.6%)
≥70	179,205 (6.4%)	53,387 (6.4%)	11,234 (5.1%)

SD = standard deviation.

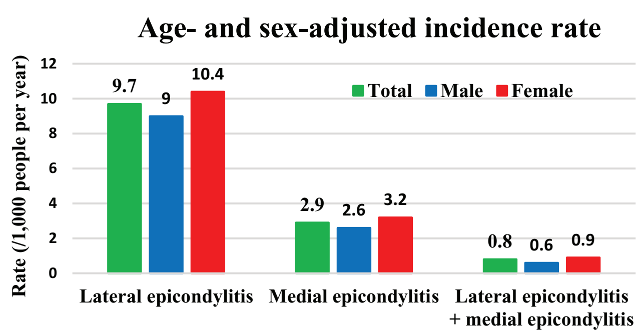

Figure 1. Mean annual age- and sex-adjusted incidence rates for patients with lateral or medial epicondylitis. Incidence rates are presented per 1000 people.

4. Discussion

In this study, we evaluated the epidemiology of LE and ME in the entire South Korea over a 5 years. The annual age-adjusted incidence rates of LE and ME were 9.7 cases per 1000 people and 2.9 cases per 1000 people, respectively. Additionally, the annual age-adjusted incidence rate for patients with concurrent LE and ME was 0.8 cases per 1000 people. The age-adjusted incidence rate of LE did not change significantly during the study period, whereas the age-adjusted prevalence rate increased significantly. For ME, the age-adjusted incidence and prevalence rates significantly increased. Furthermore, the number of surgeries performed for LE and ME increased annually, and the proportion of arthroscopic surgeries for LE did not change significantly during the study period.

Several studies have reported various incidence and prevalence rates of LE.[11,12] Sanders et al[11] reported that the annual incidence rate of LE was 3.4 per 1000 people in Olmsted County, Minnesota. Feleus et al[12] reported that the annual incidence of LE in general practice in the Netherlands was 11.0 per 1000 people. In the current study, the annual incidence rate of LE was 9.7 per 1000 people. The race is a known risk factor for LE.[4] Few studies have been conducted on the incidence of LE in Asians; therefore, further epidemiological studies in the Asian population are required.

LE occurred more frequently than ME did.[13] Wolf et al[4] investigated the incidence rates of LE and ME in the United States military population and, reported an LE to ME ratio of 3.7:1. Shiri et al[14] also examined the prevalence rates of LE and ME among 4783 individuals in Finland and found a ratio of 3.3:1. In this study, the incidence of LE was approximately 3.3 times higher than that of ME. However, a notable observation was the steady increase in ME incidence during the study period. Although the exact reason for this increase is unknown, it may be attributable to increasing engagement in sports activities such as golf, tennis, baseball, weightlifting, and bowling.[15,16] In people who play golf, ME is attributed to inappropriate club throwing from the apex of the backswing downwards towards the impact of the ball. This "hitting from the top" creates excessive valgus stress on the dominant elbow and can lead to tension overload injury to the flexor pronator group.[17] As golf is becoming increasingly popular in South Korea,[18] the incidence of ME is expected to gradually increase in the future.

According to our results, the incidence of LE did not significantly change during the study period. Sander et al[11] reported that the incidence of LE decreased between 2000 and 2012 in Olmsted County, Minnesota. Although the reasons for this decrease are unknown, the authors suggested various factors, including a true change in the incidence or decrease in the number of patients with mild diseases seeking professional care after using alternative resources for self-diagnosis and treatment. In South Korea, many patients with mild LE seek alternative medicines, such as acupuncture.[19] Hence, even if the number of patients with LE related to sports activities increases,[16,18,20] significant change in the incidence rate of LE may not be observed, owing to the increase in the number of patients using alternative medicine without visiting medical institutions. In addition, a true change in the incidence of work-related LE may have influenced the overall incidence of LE.

Although the incidence of LE remained constant during the study period, its prevalence steadily increased. Most cases of LE resolve spontaneously within 1 year with standard conservative management.[2] Despite the absence of significant changes in the incidence rate, the steady increase in prevalence can be attributed to the growing number of chronic recalcitrant LE cases. While most LE cases can be managed effectively without surgery, approximately 4% to 11% of patients require surgical intervention because of chronic recalcitrant elbow pain and functional disability.[3] The increase in the number of chronic recalcitrant LE cases is also speculated to contribute to the annual increase in surgical treatments.

In the present study, the proportion of patients receiving surgical treatment was lower (0.8% among patients with LE and 1.0% among patients with ME) than that in previous studies.[5,6] Degan et al[7] reported a surgical rate of 2% for LE based on a national database of 85,318 patients in the United States between 2007 and 2014. This rate was also lower than those reported in previous studies.[5,6] Kachooei et al[5] investigated the factors influencing the surgical treatment of LE and showed that the hazard ratio for surgery was 12 times greater if the initial provider was an orthopedic surgeon rather than a non-surgeon.

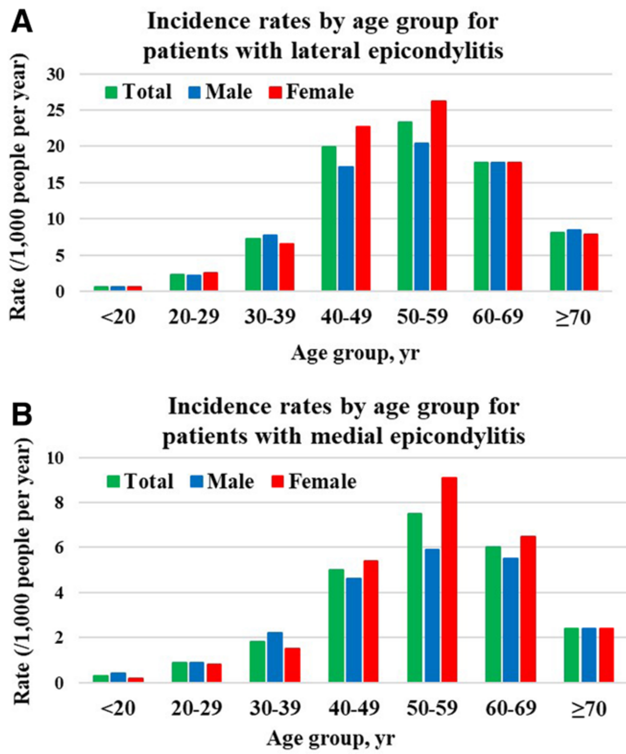

Figure 2. Sex-specific incidence rates by age group for patients with lateral or medial epicondylitis. Rates are presented per 1000 people per year. (A) Lateral epicondylitis, (B) medial epicondylitis.

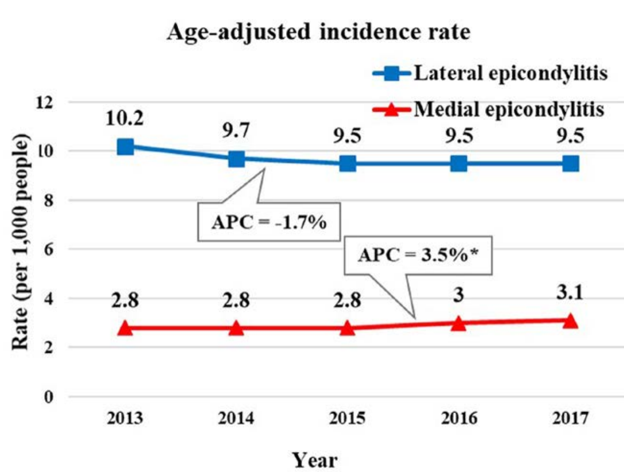

Figure 3. Age-adjusted incidence rates per 1000 people for patients with lateral or medial epicondylitis. APC = annual percentage change, *$P < .05$.Mean APC in patients with lateral epicondylitis = -1.7%, 95% confidence interval -3.7% to 0.4%, ($P = .08$).Mean APC in patients with medial epicondylitis = 3.5%, 95% confidence interval 1.5% to 5.6%, ($P = .01$).

Thus, studies using nationwide data may report a lower operation rate for epicondylitis compared to previous studies, as most patients with epicondylitis are managed by primary care physicians in clinics where surgical intervention is not commonly performed.

Among the patients with LE and ME, women had higher surgical rates than men. This may be attributed to the higher risk of sustained LE in women, which has been associated with genetic factors, such as *COL5A1* gene variants.[21–23] Surgery rates were also the highest among patients in their 50 s, followed by those in their 40 s. According to one study, being under 65 years of age is a risk factor for conservative treatment failure in LE and ME.[24] The 50 and 40 s are active working years during which they often continue to perform repetitive tasks despite pain, potentially leading to chronic recalcitrant epicondylitis and an increased likelihood of requiring surgical intervention.

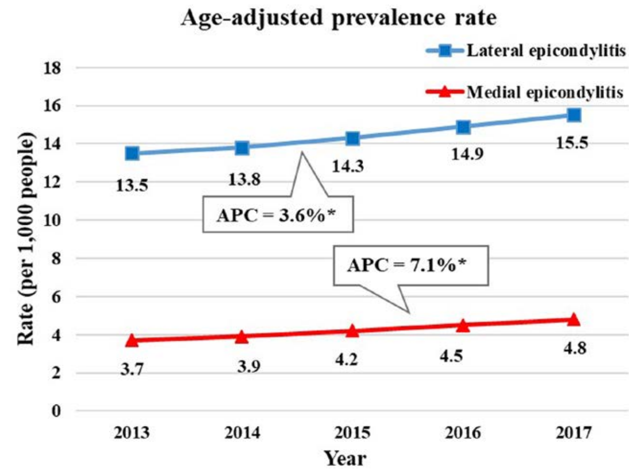

Figure 4. Age-adjusted prevalence rates per 1000 people for patients with lateral or medial epicondylitis. APC = annual percentage change, *$P < .05$.Mean APC in patients with lateral epicondylitis = 3.6%, 95% confidence interval 2.8% to 4.4%, ($P < .001$).Mean APC in patients with medial epicondylitis = 7.1%, 95% confidence interval 6.4% to 7.7%, ($P < .001$).

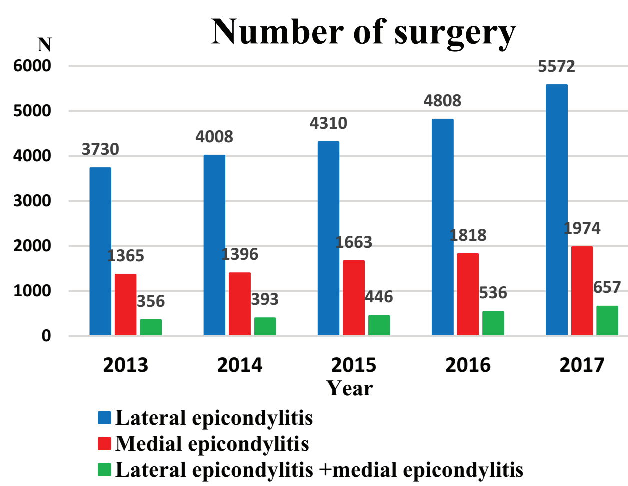

Figure 5. Number of surgeries by year for patients with lateral or medial epicondylitis.

Many studies have compared the outcomes of open and arthroscopic approaches for LE and have reported similar results.[25,26] In the United States, the proportion of arthroscopic surgery for LE remained consistently below 10%, with no significant changes observed from 2007 to 2014.[7] Although the arthroscopic technique offers the advantage of diagnosing and treating concomitant pathologies through minimal incisions, it is often associated with a steeper learning curve and higher costs owing to the need for specialized equipment and training. Conversely, the open technique is widely regarded as a simpler and more cost-effective approach because it requires less equipment and can be performed more quickly.[25,27] Furthermore, the open approach allows tendon repair using suture anchors to maximize grip strength preservation.[28] In cases of extensive tendon degeneration or severe fibrosis, surgeons may prefer

Table 3

Demographic results of patients who underwent surgery.

Variable	Lateral epicondylitis	Medial epicondylitis	Lateral epicondylitis + medial epicondylitis
Number	22,428	8216	2388
Sex, n (%)			
Male	8778 (39.1%)	2450 (29.8%)	676 (28.3%)
Female	13,650 (60.9%)	5766 (70.2%)	1712 (71.7%)
Age, mean ± SD, year	50.0 ± 8.4	52.0 ± 8.3	51.1 ± 7.8
Age group, n (%)			
<20 yr	30 (0.1%)	13 (0.2%)	3 (0.1%)
20–29	227 (1.0%)	96 (1.2%)	17 (0.7%)
30–39	1971 (8.8%)	458 (5.6%)	148 (6.2%)
40–49	7963 (35.5%)	2077 (25.3%)	725 (30.4%)
50–59	9657 (43.1%)	4236 (51.5%)	1212 (50.8%)
60–69	2301 (10.3%)	1188 (14.4%)	254 (10.6%)
≥70	279 (1.2%)	148 (1.8%)	29 (1.2%)

SD = standard deviation.

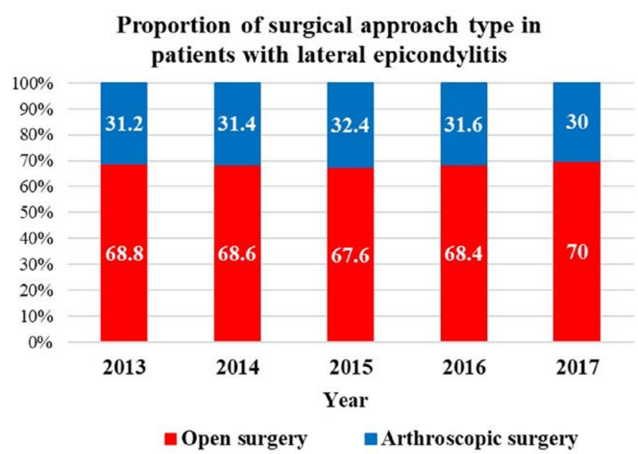

Figure 6. Proportion of surgical treatment type in patients with lateral epicondylitis.

open surgery for its effectiveness in thoroughly debriding and repairing the affected area. These factors may contribute to the ongoing preference for open surgery in certain settings, even with the availability of advanced arthroscopic techniques. In the present study, the proportion of arthroscopic surgeries was approximately 30%, which is higher than that in the United States[7]; However, this also indicated that many surgeons in South Korea preferred the open approach, and no significant changes were observed during the study period.

Few studies have investigated the incidence and prevalence of concurrent LE and ME. Shiri et al[14] investigated the prevalence of concurrent LE and ME and reported definite cases in 0.1% of the patients. This rate is notably low compared with the reported prevalence of LE (1.3%). In the current study, the incidence of LE was 9.7 per 1000 people, whereas concurrent LE and ME showed a lower rate of 0.8 per 1000 people, indicating an approximately 12-fold difference and demonstrating a pattern similar to that previously reported.[14] In addition, patients with concurrent LE and ME exhibited a higher tendency to undergo surgical treatment than those with isolated LE or ME, suggesting a higher prevalence of recalcitrant chronic cases.

Although this study used a large sample size based on a nationwide database, it has several limitations. First, this study had the intrinsic weakness of database studies, which rely on diagnostic codes and other data entered by healthcare providers. Therefore, it was not possible to confirm the accuracy of the entered diagnostic codes. Second, distinguishing whether epicondylitis occurred on the left or right side of the elbow is challenging in the HIRA database. In our study, even if epicondylitis occurred on one side of the elbow in the same patient and subsequently occurred on the opposite side, it was calculated as the incidence rate only when it first occurred. Third, the HIRA data do not include information on occupational exposure, tobacco use, or types of activities. As a result, analyzing the risk factors for epicondylitis and the likelihood of progression to surgery is challenging. Finally, there is a possibility of code errors in large databases.

5. Conclusion

In South Korea, the incidence of LE did not significantly change from 2013 to 2017, whereas that of ME showed an increasing trend. The prevalence of LE and ME increased during this period. This increasing prevalence is attributed to the increased incidence of chronic recalcitrant epicondylitis. Consequently, a tendency towards increased rates of surgeries for epicondylitis was also observed. However, given the inherent limitations of the database, including the lack of detailed clinical variables, further longitudinal studies with comprehensive patient data are needed to identify risk factors for epicondylitis and the necessity of surgical treatment.

Author contributions

Conceptualization: Bong Gun Lee, Young-Hoon Jo.
Data curation: Wan-Sun Choi, Seung Hun Baek.
Formal analysis: Young Seok Lee.
Methodology: Young Seok Lee, Young-Hoon Jo.
Writing – original draft: Bong Gun Lee, Young Seok Lee, Chang-Hun Lee, Young-Hoon Jo.
Writing – review & editing: Bong Gun Lee, Chang-Hun Lee, Young-Hoon Jo.

References

[1] Leclerc A, Landre MF, Chastang JF, Niedhammer I, Roquelaure Y. Upper-limb disorders in repetitive work. Scand J Work Environ Health. 2001;27:268–78.
[2] Kim GM, Yoo SJ, Choi S, Park YG. Current trends for treating lateral epicondylitis. Clin Shoulder Elb. 2019;22:227–34.
[3] Brummel J, Baker CL III, Hopkins R, Baker CL Jr. Epicondylitis: lateral. Sports Med Arthrosc Rev. 2014;22:e1–6.
[4] Wolf JM, Mountcastle S, Burks R, Sturdivant RX, Owens BD. Epidemiology of lateral and medial epicondylitis in a military population. Mil Med. 2010;175:336–9.
[5] Kachooei AR, Talaei-Khoei M, Faghfouri A, Ring D. Factors associated with operative treatment of enthesopathy of the extensor carpi radialis brevis origin. J Shoulder Elbow Surg. 2016;25:666–70.

[6] Sanders TL, Maradit Kremers H, Bryan AJ, Ransom JE, Morrey BF. Health care utilization and direct medical costs of tennis elbow: a population-based study. Sports Health. 2016;8:355–8.
[7] Degen RM, Conti MS, Camp CL, Altchek DW, Dines JS, Werner BC. Epidemiology and disease burden of lateral epicondylitis in the USA: analysis of 85,318 patients. HSS J. 2018;14:9–14.
[8] Park JS, Lee HJ, Jo Y-H, Lee MK, Lee BG. Surgical trends of shoulder arthroplasty: nationwide epidemiologic study in South Korea. Clin Orthop Surg. 2023;15:290–9.
[9] Jo YH, Lee KH, Lee BG. Surgical trends in elderly patients with proximal humeral fractures in South Korea: a population-based study. BMC Musculoskelet Disord. 2019;20:136.
[10] Martinez-Huedo MA, Jiménez-García R, Mora-Zamorano E, Hernández-Barrera V, Villanueva-Martinez M, Lopez-de-Andres A. Trends in incidence of proximal humerus fractures, surgical procedures and outcomes among elderly hospitalized patients with and without type 2 diabetes in Spain (2001–2013). BMC Musculoskelet Disord. 2017;18:522.
[11] Sanders TL Jr, Maradit Kremers H, Bryan AJ, Ransom JE, Smith J, Morrey BF. The epidemiology and health care burden of tennis elbow: a population-based study. Am J Sports Med. 2015;43:1066–71.
[12] Feleus A, Bierma-Zeinstra SM, Miedema HS, Bernsen RM, Verhaar JA, Koes BW. Incidence of non-traumatic complaints of arm, neck and shoulder in general practice. Man Ther. 2008;13:426–33.
[13] Shiri R, Viikari-Juntura E. Lateral and medial epicondylitis: role of occupational factors. Best Pract Res Clin Rheumatol. 2011;25:43–57.
[14] Shiri R, Viikari-Juntura E, Varonen H, Heliövaara M. Prevalence and determinants of lateral and medial epicondylitis: a population study. Am J Epidemiol. 2006;164:1065–74.
[15] Amin NH, Kumar NS, Schickendantz MS. Medial epicondylitis: evaluation and management. J Am Acad Orthop Surg. 2015;23:348–55.
[16] Thériault G, Lachance P. Golf injuries. An overview. Sports Med. 1998;26:43–57.
[17] Ciccotti MG, Ramani MN. Medial epicondylitis. Tech Hand Up Extrem Surg. 2003;7:190–6.
[18] Lee JR, Kwon KN. Popularity of screen golf in Korea and its sociocultural meaning. Int J Environ Res Public Health. 2021;18:13178.
[19] Cho Y, Yeo J, Lee YS, et al. Healthcare utilization for lateral epicondylitis: a 9-year analysis of the 2010–2018 Health Insurance Review and Assessment Service national patient sample data. Healthcare (Basel). 2022;10:636.
[20] Karabinov V, Georgiev GP. Lateral epicondylitis: new trends and challenges in treatment. World J Orthop. 2022;13:354–64.
[21] Sayampanathan AA, Basha M, Mitra AK. Risk factors of lateral epicondylitis: a meta-analysis. Surgeon. 2020;18:122–8.
[22] Chen Q, Shen P, Zhang B, Chen Y, Zheng C. A meta-analysis of the risk factors for lateral epicondylitis. J Hand Ther. 2024;37:44–52.
[23] Altinisik J, Meric G, Erduran M, Ates O, Ulusal AE, Akseki D. The BstUI and DpnII variants of the COL5A1 gene are associated with tennis elbow. Am J Sports Med. 2015;43:1784–9.
[24] Degen RM, Cancienne JM, Camp CL, Altchek DW, Dines JS, Werner BC. Patient-related risk factors for requiring surgical intervention following a failed injection for the treatment of medial and lateral epicondylitis. Phys Sportsmed. 2017;45:433–7.
[25] Clark T, McRae S, Leiter J, Zhang Y, Dubberley J, MacDonald P. Arthroscopic versus open lateral release for the treatment of lateral epicondylitis: a prospective randomized controlled trial. Arthroscopy. 2018;34:3177–84.
[26] Kwon BC, Kim JY, Park KT. The Nirschl procedure versus arthroscopic extensor carpi radialis brevis débridement for lateral epicondylitis. J Shoulder Elbow Surg. 2017;26:118–24.
[27] López-Alameda S, Varillas-Delgado D, De Felipe-Gallego J, González-Granados MG, Hernández-Castillejo LE, García-de Lucas F. Arthroscopic surgery versus open surgery for lateral epicondylitis in an active work population: a comparative study. J Shoulder Elbow Surg. 2022;31:984–90.
[28] Donaldson CT, Finley ZJ, O'Brien MJ. Lateral epicondylitis debridement and repair using knotless suture anchor. Arthrosc Tech. 2019;8:e775–9.