



The demand incidence of symptomatic ankle osteoarthritis presenting to foot & ankle surgeons in the United Kingdom

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ABSTRACT

Background: Ankle arthritis is a cause of major disability; however reports in the literature on the incidence of ankle osteoarthritis are rare.

Objectives: To explore the methodological challenges in obtaining an incidence of ankle osteoarthritis and to estimate the incidence of symptomatic osteoarthritis presenting to Foot & Ankle specialists in the UK.

Methods: We searched available national diagnosis databases and also sent out a questionnaire-based survey to all Consultant members of the British Orthopaedic Foot & Ankle Society ($n = 180$).

Results: 123 completed survey questionnaires were returned (68%) with each surgeon seeing on average 160 cases of symptomatic ankle arthritis and performing on average 20 definitive procedures for end-stage ankle osteoarthritis per year. There are no internationally agreed diagnostic or treatment codes specific for ankle osteoarthritis.

Conclusion: There are an estimated 29,000 cases of symptomatic ankle osteoarthritis being referred to specialists in the UK, representing a demand incidence of 47.7 per 100,000. 3000 definitive operations to treat end stage ankle osteoarthritis take place in the UK annually. We recommend that specific codes pertaining to ankle arthritis and its treatment be included in any future revisions of the WHO International Classification of Diseases (ICD) and operative procedure coding systems.

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1. Introduction

Ankle arthritis is a cause of major disability and has a similar impact on quality of life as hip arthritis [1].

The commonest form of ankle arthritis is osteoarthritis secondary to trauma caused by fractures or severe sprains [2–4]. The ankle joint is subjected to the highest forces per square centimetre and is injured more commonly than any other joint in the body [5]. Ankle sprains are one of the most common reasons for attendance to Emergency Departments [6] with a reported incidence between 220 and 720 per 100,000 [6,7]. Ankle fractures have a reported incidence between 112 and 248 per 100,000, and are increasing especially in young athletes and elderly females [8–11]. Hence ankle osteoarthritis is likely to become an increasingly important health problem in the coming years. Other causes of ankle

osteoarthritis include longstanding inflammatory arthropathies, haemochromatosis, and haemophilic arthropathy [5].

Reports in the literature on the prevalence and incidence of ankle arthritis are rare. The aims of this study were to explore why there is no published incidence of ankle osteoarthritis in the literature and make an estimation as to the demand incidence of symptomatic ankle osteoarthritis by searching relevant national databases as well as surveying Foot and Ankle Specialists in the United Kingdom regarding their workload and common management practices relating to ankle osteoarthritis.

2. Methods

2.1. Database analysis

The Hospital Episode Statistics (HES) database is a national database used by the National Health Service (NHS) Hospitals in England and Wales. We searched the HES database for both diagnostic and treatment data. The HES database uses the World Health Organisation (WHO) International Classification of Diseases

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version 10 (ICD-10) to record diagnosis; and the Office of Population, Censuses and Surveys Classification of Surgical Operations and Procedures (OPCS-4) codes to record operative interventions. We searched under all possible diagnostic codes and treatment codes pertaining to ankle replacement and ankle arthrodesis (Table 1).

2.2. Survey

Following clearance from local institutional ethics board, questionnaires were sent to all Consultant members of the British Orthopaedic Foot & Ankle Society, based in the United Kingdom ($n = 180$). The survey was sent by email and by post to those who did not respond to email. Respondents were asked to provide details as to the number of new referrals they see with symptomatic ankle osteoarthritis. They were also asked a series of questions pertaining to their current management practice, including the number of ankle arthrodeses and ankle replacements they performed (Table 1). The data was collected between January and March 2008 and was entered into Microsoft Excel to generate descriptive statistics. Incidences were calculated by dividing the predicted number of new cases by the population at risk over a period of 12 months and expressed as the number of cases per 100,000 of the population. The population of the United Kingdom at the time of the study was 60.9 million (World Bank, World Development Indicators).

3. Results

3.1. Database analysis

The HES database records diagnosis (ICD-10) codes and procedure (OPCS-4) codes. There are no specific codes for ankle osteoarthritis in the ICD-10 coding system. The M19 classification (ICD-10) is used to classify any ankle or foot osteoarthritis but cannot distinguish the specific diagnosis of ankle osteoarthritis from any other cause (e.g. subtalar or talonavicular osteoarthritis). In addition, the HES database does not at present record outpatient diagnoses and so no meaningful data on the demand incidence of ankle osteoarthritis was available for analysis.

With regards operative procedures, the OPCS-4 system does not have any specific codes for ankle replacement or ankle arthrodesis and as such there are many possible coding options available.

Table 1

Brief details of some of the questions asked in the questionnaire.

Q.1	How many new referrals on average do you see a week with symptomatic ankle osteoarthritis?
Q.2	How many ankle arthrodesis do you perform each year?
Q.3	What is your preferred technique for ankle arthrodesis?
	<input type="checkbox"/> Arthroscopic
	<input type="checkbox"/> Open Lateral Approach
	<input type="checkbox"/> Anteromedial Approach
	<input type="checkbox"/> Other (free text)
Q.4	How many ankle replacements do you perform each year in your current practice?

Table 2

OPCS4.6 Codes that can all be used to code for an ankle replacement and ankle arthrodesis procedure. In order to ascertain the number of ankle procedures each of these codes need to be cross-referenced with the anatomical site codes that pertain to the "ankle" or lower end of the tibia. This includes all possible coding options for ankle replacement and ankle arthrodesis including revision procedures.

Description	OPCS 4.5 Code
Codes pertaining to prosthetic replacement	W431-W450; W530-W549
Codes pertaining to fusion	W041-W049; W600-W603; W608-W613; W618-W622; W628-W632; W638-W639; W641-W642; W648-W649
Anatomical site codes for "Ankle" or "Lower end of Tibia"	Z775, Z856, Z858, and Z859

Working closely with our clinical coders we identified 65 possible OPCS-4.5 codes for replacement and arthrodesis, each of which had to be cross referenced with anatomical site codes that pertain to the "ankle" or lower end of the tibia (Table 2). By doing so, 2995 surgical procedures were identified in the corresponding year.

3.2. Survey

123 completed questionnaires were returned (response rate = 68%). The total number of new cases of symptomatic ankle osteoarthritis presenting to all 123 respondents to this survey was 444 per week. The average number of estimated new cases of symptomatic ankle osteoarthritis presenting to each respondent was 3.67 per week (range 1–13).

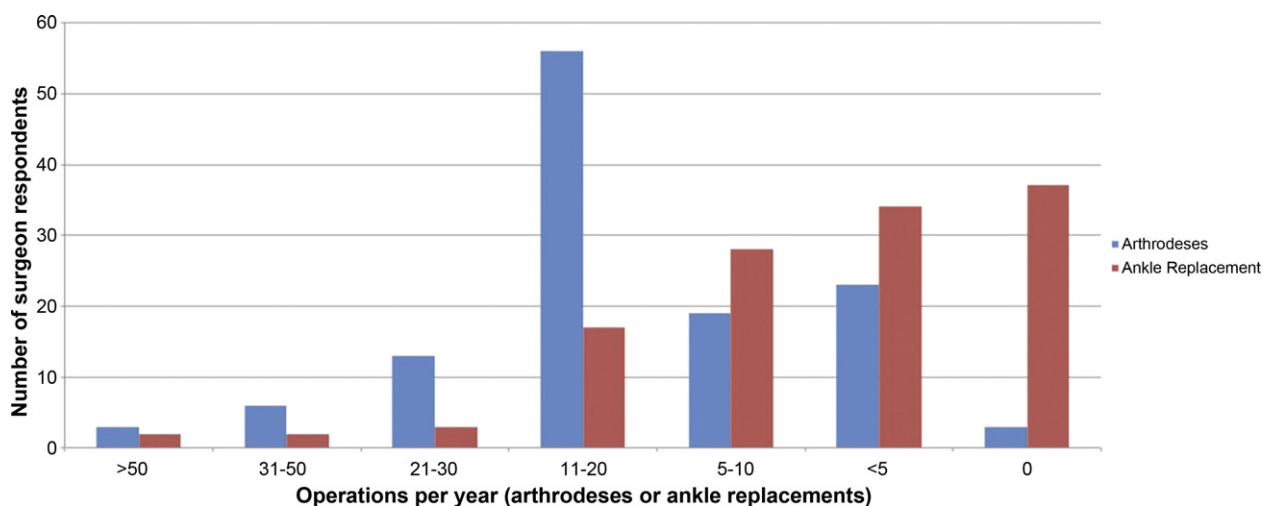


Fig. 1. Bar chart illustrating practice of UK foot & ankle surgeons in the number of ankle arthrodeses (blue bar) and ankle replacements (red bar) carried out per year. On the X-axis is the number of cases performed per year and on the Y-axis is the number of surgeons that reported that they perform that number of procedures per year. 37 (30%) respondents were not carrying out any ankle replacements at the time of the survey. Two respondents (1.6%) had an exclusive paediatric practice and were not carrying out ankle fusions or replacements. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of the article.)

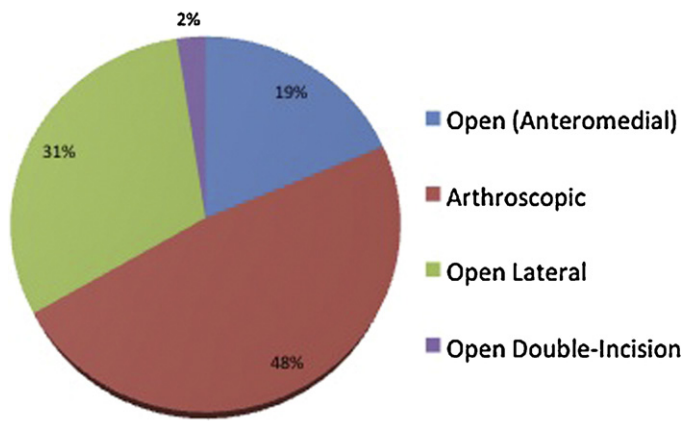


Fig. 2. Pie chart to illustrate surgeon preference of technique used to perform an arthrodesis of the ankle.

By making the assumption that each surgeon has 44 clinic weeks per year, we estimate that the annual demand incidence of ankle osteoarthritis referred to UK orthopaedic foot and ankle specialists is 29,066 cases ($180 \times 3.67 \times 44$). Assuming a UK Population size of 60.9 million, this equates to a demand incidence of 47.7 cases per 100,000.

3.2.1. Arthrodesis versus replacement

There is wide variation in practice amongst surgeons in the choice of procedure (replacement versus arthrodesis) for end stage ankle osteoarthritis, as well as the numbers performed (Fig. 1). The total number of ankle arthrodeses carried out per year by the 123 respondents was 1729. The mean number of ankle arthrodeses carried out, per year, by all respondents was 13 (range 2.5–55). And the largest number of surgeons carried out between 11 and 20 ankle arthrodeses per year (54 surgeons – Fig. 1)

The total number of ankle replacements implanted per year by the 123 respondents was 825. Thirty-seven (30%) respondents were not performing any ankle joint replacements at the time of the survey. The mean number of ankle replacements carried out per year, by surgeons who are performing ankle replacement was 8 (range 1–55). The mean number of ankle replacements carried out per year by all surgeons (including those that are not performing ankle replacement) was 2.5 (range 0–55). A very small number of surgeons carried out the largest number of ankle replacements (only 3 surgeons performing more than 50 per year).

3.2.2. Arthrodesis technique

Fifty-nine respondents (49.2%) stated that their preferred technique for performing an ankle arthrodesis was using an arthroscopic technique. Thirty-seven (30.8%) preferred an open lateral technique, 22 (18.3%) an open anteromedial technique, and two (1.7%) preferred an open medial and lateral, double-incision technique (Fig. 2).

4. Discussion

The World Health Organisation (WHO) International Classification of Disease is the coding system used internationally to code diagnoses. In most countries around the world ICD version 10 is used. In the US, ICD version 9 is still used, although plans are to move to ICD-10 in the near future. The ICD coding systems do not contain a specific code for ankle arthritis. The diagnostic code available for osteoarthritis affecting the foot and ankle is 715.17 (ICD-9) or M19 (ICD-10), but neither are specific for the ankle and hence cannot distinguish other diagnoses, such as subtalar or talonavicular osteoarthritis. In addition, because no outpatient diagnostic

data is currently captured in the UK, irrespective of the lack of relevant codes, no data is available to compare our estimation with the actual numbers that attend outpatient clinics nationally.

In the absence of a robust international coding system, it is a major challenge to accurately estimate the incidence or prevalence of symptomatic ankle arthritis and hence we felt that a survey of foot & ankle surgeons was the best available method to estimate the secondary care demand incidence for ankle osteoarthritis. Our survey estimates that the demand incidence for ankle osteoarthritis presenting to foot and ankle specialists in the United Kingdom as being 47.7 per 100,000. As far as we are aware, this is the first national estimate of the demand incidence of symptomatic ankle osteoarthritis in the literature.

We have attempted to compare our findings with other reports of the occurrence of ankle arthritis in the literature. The prevalence in the community of a painful ankle has been reported as high as 18% [12–14]. However, such population-based data describes non-specific patient reported symptoms, which will include a heterogeneous group of foot and ankle conditions. The annual general practice consultation prevalence for foot & ankle problems is 290 per 100,000 based on findings from a GP Research Database (CiPCA) [15] but this has to be interpreted with caution, since although a proportion of these patients will have ankle osteoarthritis, a diagnosis of ankle osteoarthritis is rarely made in the primary care setting [15] and due to a lack of specific primary care diagnostic codes it is equally difficult to accurately determine the demand incidence of ankle osteoarthritis in this setting.

In the secondary care setting, there have been several reports on the aetiology of ankle osteoarthritis [3,16], but none of these studies have reported the incidence or prevalence of ankle arthritis. A study of five hundred subjects with symptomatic limb joint osteoarthritis attending a rheumatology clinic reported that the incidence of symptomatic ankle arthritis was nine times lower than that for the knee or hip [17], although the term incidence was incorrectly used by this study and they were actually referring to point prevalence. This however was a retrospective study looking at a cohort of patients in a rheumatology clinic and is likely to represent a very different population of patients than those referred to foot & ankle surgeons.

4.1. Treatments

There was variability in practice amongst respondents both in terms of the choice of procedures performed and number of cases performed. The 123 respondents to our survey carry out 2553 definitive procedures per year for end stage ankle osteoarthritis (824 ankle replacements, and 1729 ankle arthrodeses).

One of the limitations of our study was that we surveyed only members of the British Orthopaedic Foot & Ankle Society, which is only a small proportion of the 1600 orthopaedic surgeons in the UK and we cannot fully exclude the possibility that we may have missed surgeons with higher or lower caseloads and the presence of recall bias, in that surgeons under or overestimated their referral caseload.

We therefore elected to verify the number of cases of ankle replacement and arthrodesis actually recorded on a British national hospital database (HES), which was 2995 cases. As our estimation calculated from our survey is within 15% of the numbers identified in the database search, this provides some validation of our methodology. The HES data only includes surgeons from England and Wales, and hence excludes surgeons in Northern Ireland or Scotland. Some of BOFAS members are from Scotland and Northern Ireland and hence there is a degree of missing data from both estimations with the total number of operative procedures likely to be larger than our estimation. We infer that our estimation of the demand incidence of ankle osteoarthritis is likely to be reasonably

accurate and possibly underestimated. Recently a National Joint Registry for ankle replacements was started in England & Wales [18] and in time this information will provide a more accurate number of cases performed, although will not include data on ankle arthrodeses.

5. Conclusion

Published information on the incidence and burden of ankle arthritis is sparse largely due to a lack of relevant specific codes to record this diagnosis. The majority of ankle osteoarthritis is post-traumatic and we estimate that at least 29,000 cases of symptomatic ankle osteoarthritis are being referred to specialist foot and ankle surgeons each year in the United Kingdom, representing a demand incidence of 47.7 per 100,000. At least 3000 cases are being treated by surgical intervention (ankle replacement and ankle arthrodesis) with marked variation in the choice of treatment amongst surgeons. We acknowledge that the incidence estimates are representative only of a UK-based system of care and that this may not transfer to other types of healthcare systems, none the less, we believe that there is an urgent need for the World Health Organisation (WHO) and for National Hospital Databases to consider the addition of “ankle osteoarthritis” as a diagnostic code for future revisions of the ICD and “ankle replacement” and “ankle arthrodesis” for future revisions of the interventional procedure coding systems. Governments and insurers need to consider the impact that ankle arthritis is likely to have on their patient populations when budgeting for future healthcare burden.

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Conflict of interest statement

Although none of the authors has received or will receive benefits for personal or professional use from a commercial party related directly or indirectly to the subject of this article, benefits have been or will be received but will be directed solely to a research fund, foundation, educational institution, or other non-profit organisation with which one or more of the authors are associated.

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