Rates of surgery for frozen shoulder: an experience in England

Tariq A. Kwaees[1]
Charalambos P. Charalambous[2]

[1] Department of Trauma & Orthopedics, Blackpool Victoria Hospital, UK
[2] Department of Orthopaedics, Blackpool Victoria Hospital; School of Medicine and Dentistry, University of Central Lancashire; Institute of Inflammation and Repair, Faculty of Medical and Human Sciences, University of Manchester, UK

Corresponding author:
Tariq A. Kwaees
Department of Trauma & Orthopedics, Blackpool Victoria Hospital
Whinney Heys Road
FY3 8NR Blackpool, UK
E-mail: tariqkwaees@gmail.com

Summary

Aim: **the aim of this study was to identify the incidence of surgical treatment for frozen shoulder in a western population.**
Methods: **patients included in this study all resided within a well-defined area in the North West of England, all had surgery for frozen shoulder over a 3-year period and were identified from theatre logbooks of two local hospitals. Cases having surgery for shoulder stiffness other than frozen shoulder were excluded. Local and national population size estimates were based on data obtained from the UK Office for National Statistics.**
Results: **117 patients underwent surgery for frozen shoulder during the period examined; of these 101 had arthroscopic arthrolysis and 16 had manipulation under anaesthesia. The overall incidence of frozen shoulder surgery was calculated at 2.67 procedures per 10,000 general population per year, and at 7.55 for those aged 40-60.**
Conclusion: **surgical intervention for frozen shoulder is common, estimated at over 14,180 cases per year in England. Given the variation in costs associated with arthroscopic arthrolysis and manipulation under anaesthesia, comparative studies of the cost effectiveness of the two procedures would be of great value.**
Level of evidence: 2C (outcome research).

KEY WORDS: adhesive capsulitis, arthroscopic arthrolysis, frozen shoulder, shoulder surgery.

Introduction

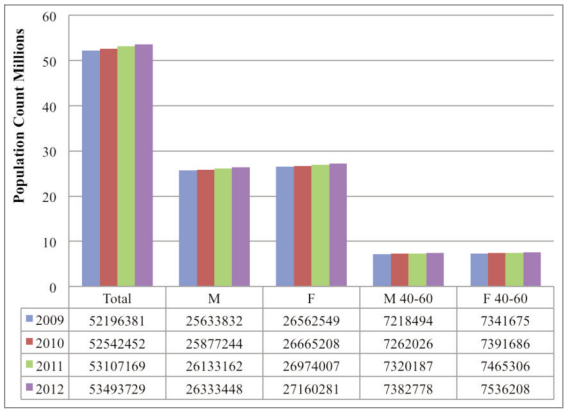
Frozen shoulder is a condition characterised by an insidious limitation in global shoulder movement of varying severity. In the general population it has a prevalence of up to 8.2% of men and 10.1% of women of working age with a peak age of 55[1]. The non-dominant extremity is more likely to be afflicted with bilateral disease present in approximately 20%[2,3]. Little is known of the true incidence of frozen shoulder but it is believed to be 2.4 per 1,000 population[4]. Frozen Shoulder can be primary (idiopathic) or secondary to another cause such as diabetes, trauma, rotator cuff tears and prolonged immobilization[1,2]. It is classically described in three phases; phase one, where pain predominates, phase two where stiffness predominates and phase three, where symptoms begin to resolve[5]. In most cases the natural history of frozen shoulder is one of spontaneous improvement over a period of two to three years and thus treatment is aimed at alleviating symptoms and hastening recovery[6-9]. Still some studies have found up to 15% of sufferers have long term disability[3].
Management of frozen shoulder can be non-surgical, ranging from supervised neglect, to joint distension, or surgical treatment in the form of manipulation under anaesthesia (MUA), arthroscopic arthrolysis or open capsular release[7,8,10-25]. Non-surgical treatment is the first line approach in the majority of cases, followed by surgical intervention in those who fail to respond. There is limited high quality evidence to support one treatment over another, be it surgical or non-surgical, with even less data on rates of surgery and cost effectiveness[21, 25-27]. The cost of the various non-surgical treatment modalities may vary from as little as £36 for unguided steroid injections to as high as £600 for a combination of physiotherapy and steroid injection[26]. The cost of surgical interventions is higher, ranging from £1440 for an MUA to £2200 for capsular release[26].
Although the epidemiology of frozen shoulder in the general population and certain at risk subgroups has been previously studied[3,28,29], there does not seem to be any evidence on the rates of surgery for frozen shoulder. Such information would be of great value in

assessing the surgical impact of frozen shoulder and in planning clinical trials to evaluate emerging treatment methods. The aim of this study was to identify the incidence of the surgical treatment for frozen shoulder in a western population in the North West of England.

Methods

Retrospective data collection was carried out at two hospitals, one in the National Health Service (NHS) and the other in the private sector. Patients that had surgery for frozen shoulder were identified form theatre logbooks. They were identified as resident within the catchment area of the local Blackpool Primary Care Trust (PCT), based on their general practitioner's (GP) postcode. Identification of those GP postcodes that were within the local Blackpool PCT catchment population was obtained using a freedom of information request submitted to the PCT. Data over a 3-year period (August 2009 to September 2012) was collected along with patient demographics (age and sex). Pre-surgery imaging (radiographs, ultrasonography, magnetic resonance imaging and computed tomography) of these patients was examined to exclude those who had procedures for causes of shoulder stiffness other than frozen shoulder. Local and national population size estimates were based on census data obtained from the UK Office for National Statistics (Figs. 1, 2). Population size estimates for those aged 40-60 (peak incidence of frozen shoulder) was then calculated from this data. Statistical analysis was carried out using excel 2010. As our data included 3 months of 2009 and 8.5 months of 2012, annual rates were calculated by converting the data into 12-month figures assuming the monthly rate would be similar for each. 95% confidence intervals for each year were calculated but as these may be too narrow, a second confidence interval based on inter-annual variation was also calculated in order to reduce bias.

As we did not know the true incidence of frozen shoulder in the general population we estimated the total number of frozen shoulders for the population of England for all ages, and also for the 40-60-year-age group. This was achieved by looking first at the ages of patients who had frozen shoulder in 2009 to 2012 and then at all ages for an estimate of the total number in the population in England. This process was repeated for the 40-60-age group. The estimated total number of operations in England was calculated by extrapolating rates in the PCT to the whole population in England.

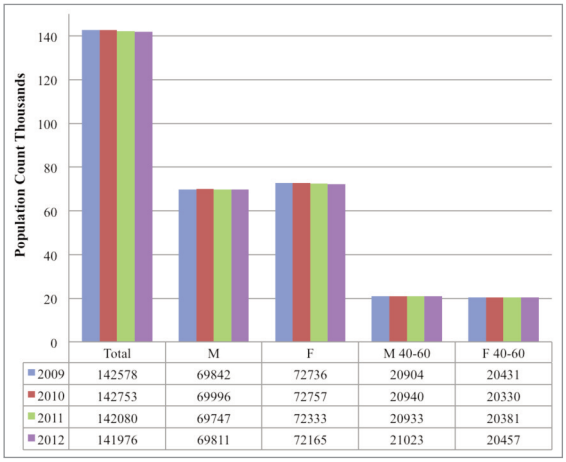


	Total	M	F	M 40-60	F 40-60
2009	52196381	25633832	26562549	7218494	7341675
2010	52542452	25877244	26665208	7262026	7391686
2011	53107169	26133162	26974007	7320187	7465306
2012	53493729	26333448	27160281	7382778	7536208

Figure 1. Population count in the examined years for England. Source: UK Office for National Statistics. M: Male, F: Female.

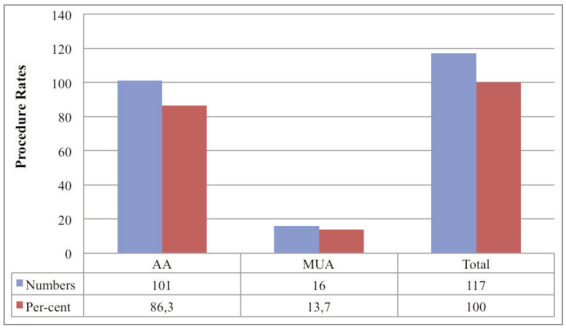
Results

In total 117 patients underwent surgery for frozen shoulder during the period examined. Of these 101 had arthroscopic arthrolysis and 16 underwent manipulation under anaesthesia (Fig. 3). For our PCT the incidence of frozen shoulder surgery was calculated at 2.67 procedures per 10,000 per year. This rose to 7.55 for those aged 40-60 (Fig. 4). Taking into account the national population size estimates (Figs. 1, 2), we calculated that the mean rate of frozen shoulder for the whole of England at 14,188.64 cases per year in the general population, and 11,118.15 per year in the 40-60-age group (Fig. 5).



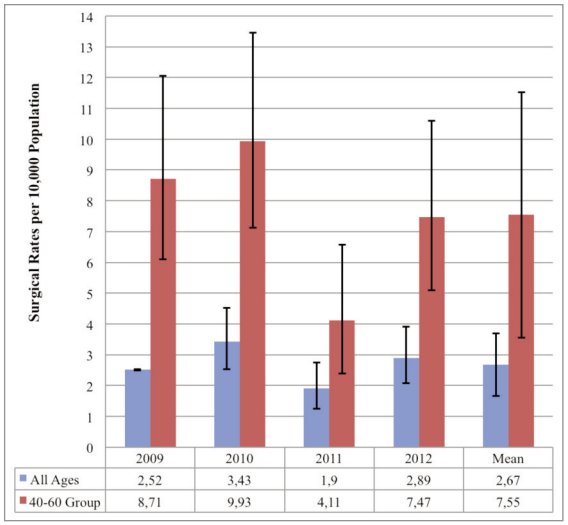
	Total	M	F	M 40-60	F 40-60
2009	142578	69842	72736	20904	20431
2010	142753	69996	72757	20940	20330
2011	142080	69747	72333	20933	20381
2012	141976	69811	72165	21023	20457

Figure 2. Population count in the given years for the Blackpool Primary Care Trust (PCT). Source: UK Office for National Statistics / Blackpool PCT. M: Male, F: Female.



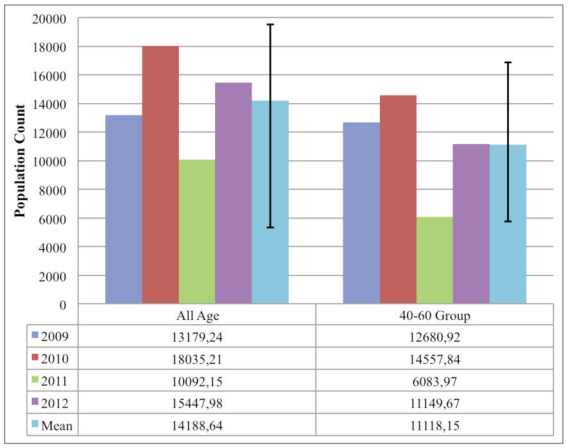
	AA	MUA	Total
Numbers	101	16	117
Per-cent	86,3	13,7	100

Figure 3. 117 procedures performed for Frozen Shoulder over the period analysed. MUA: Manipulation Under Anaesthesia, AA: Arthroscopic Arthrolysis.



	2009	2010	2011	2012	Mean
All Ages	2,52	3,43	1,9	2,89	2,67
40-60 Group	8,71	9,93	4,11	7,47	7,55

Figure 4. Annual operative rates for frozen shoulder per 10,000 general population (blue) and per 10,000 of 40-60 year olds (red) in our PCT. The 95% confidence interval is indicated by error margins.



	All Age	40-60 Group
2009	13179,24	12680,92
2010	18035,21	14557,84
2011	10092,15	6083,97
2012	15447,98	11149,67
Mean	14188,64	11118,15

Figure 5. Estimated number of frozen shoulder surgery in the English population in the years analysed. The mean for the 4 years assessed and the confidence intervals are demonstrated by the error margins.

Discussion

Our results show that rates of surgical treatment for frozen shoulder in a western population are relatively high. We calculated the incidence of frozen shoulder surgery in the general population for a well-defined geographic area in the North West of England as 2.67 per 10,000 and 7.55 for those aged 40-60 (Fig. 4). Taking into account the national population size estimates this could account for 14,189 cases of frozen shoulder surgery in the general population of England, and 11118 in the 40-60-age group (Fig. 5). With the estimated cost of arthrolysis being £2204 and MUA being £1446 costs for surgery in the England could range from £20.5 million if all surgery was in the form of MUA to £31.3 million if all surgery was in the form of arthrolysis. There is a sparsity of high quality evidence comparing the cost effectiveness of the two procedures, and prospective well-designed trials would be of great value to investigate this further, especially given the wide variation in the surgical treatment of frozen shoulder seen amongst shoulder surgeons[30].

The limitations of this study are that patients were operated by several orthopaedic surgeons and the exact indications for proceeding to surgery could not be determined due to the retrospective nature of the study. Nevertheless, our results give a pragmatic approach and hence maybe more relevant to actual practise in a western setting. The extent to which our examined PCT data can be extrapolated to the general population is difficult to determine, however comparing the age and sex distribution of our examined PCT population and that of the rest in England demonstrated similarities, hence we feel our results are representative of the rest of England. We feel that analysis of operative theatre logs provides a more accurate method of obtaining epidemiological data, as the accuracy of hospital coding has been previously questioned[31].

Conclusion

In conclusion, we present incidence rates for frozen shoulder surgery in the North West of England and based on that we calculate estimated rates for the whole population. Such rates would be of value in assessing the health costs associated with frozen shoulder, and in planning prospective trials evaluating surgical interventions. This study was conducted ethically and in accordance with international standards as set out by this Journal[32].

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