Registry of shoulder arthroplasty – the Scottish experience

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ABSTRACT

INTRODUCTION Recognising that timely dissemination of information in the orthopaedic community was important and in the absence of any national guidelines for shoulder arthroplasty, the Scottish shoulder arthroplasty registry, a voluntary registry, was started in 1996. The goals of the registry were to assess contemporary practice, provide a benchmark against which surgeons could compare their practice, identify risk factors for a poor outcome, and to improve outcomes through continuous feedback to the participating surgeons.

PATIENTS AND METHODS A standardised proforma was used to collect information on the diagnostic and demographic data, type of procedure performed, type of implant used, any associated procedures performed in conjunction with the arthroplasty, and peri-operative complications. Postoperative pain, activity and patient satisfaction were assessed annually using another standardised proforma.

RESULTS Twenty surgeons have contributed to the register and 451 shoulder arthroplasties were registered over a 5-year period. Of patients, 23.2% were male and 76.8% female. The mean age was 65 years (range, 37–90 years). Shoulder arthroplasty was commonly performed for rheumatoid arthritis followed by trauma, osteoarthritis and avascular necrosis of the humeral head. Overall, 397 (88%) patients had a hemi-arthroplasty and 54 (12%) had a total shoulder replacement. Of the 54 cases that had a glenoid replacement, 28 were performed for inflammatory arthritis, 21 for osteoarthritis and 5 were for revisions. The humeral component was cemented in 204 (45%) cases, 160 of whom had a shoulder replacement for trauma. The glenoid component was cemented in 48 (89%) cases. Cross referencing our data with the figures of the actual number of shoulder arthroplasties performed, however, indicated that our registry at best collected only 53% of all the shoulder arthroplasties performed in Scotland annually.

CONCLUSIONS The value of a joint registry is dependent on the accuracy and completeness of the data entered. Our registry, therefore, fails as an implant registry. We believe that compliance for data registration can only be ensured if dedicated data collection staff are employed to co-ordinate the data collection and collation process.

KEYWORDS

Shoulder arthroplasty – Voluntary registry – Poor compliance

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The goals of shoulder arthroplasty are relief from pain, nearly normal shoulder function and long-term survival of the implant. New implants are designed with the expectation that they will be equivalent or superior to existing products. Regardless of how much testing is done, only in our patients do all variables such as material issues, manufacturing issues, patient-related factors and surgical technique finally come into play. As a result, premature failures can and do occur.¹ Recognising that timely dissemination of information in the orthopaedic community was important and in the absence of any national guidelines for shoulder arthroplasty, the Scottish shoulder arthroplasty registry was started in 1996. This registry was voluntary and

relied on a single surgeon (CRD) collecting and collating the data. The goals of the registry were to assess contemporary practice, provide a bench mark against which surgeons could compare their practice, provide timely information for orthopaedic community on the outcomes of shoulder arthroplasty and to identify risk factors for a poor outcome and through continuous feedback to the participating surgeons, to improve outcomes.

Patients and Methods

Two activities have been integral functions of the registry – data collection and data analysis. This was a voluntary

registry to which 20 surgeons, who had a shoulder practice, from Scotland contributed. Surgeons were individually contacted by the senior author (CRD) and encouraged to contribute to the registry. The participating surgeons agreed on a standardised diagnostic and operation code to facilitate data collection (Table 1). A standardised proforma (Proforma 1) was used to collect information on the diagnostic and demographic data, type of procedure performed, type of implant used, any associated procedures performed in conjunction with the arthroplasty, and peri-operative complications. Postoperative pain, activity and patient satisfaction were assessed annually using another standardised proforma (Proforma 2).

The senior author (CRD) collated these data on a computerised database (Microsoft Access) and provided annual feedback to the individual surgeons. In order to evaluate the percentage of shoulder arthroplasties performed in Scotland to those registered in the registry, we cross-referenced our data with the data from the Information and Statistics Division of Scotland (ISD), which is based in Edinburgh. ISD gets data from the Scottish medical records (SMR) forms that accompany every in-patient admission in Scotland. The ISD data do, however, rely on accurate coding and we, therefore, accept that its data may not be a true reflection of the number of shoulder arthroplasties performed in Scotland.

Results

Twenty surgeons have contributed to the register, performing a varied number of shoulder arthroplasties

Table 1 Standardised codes agreed on following a consultation with the Information and Statistics Division, Scotland.

Shoulder hemi-arthroplasty	
Primary cemented	W491
Primary uncemented	W501
Primary nec	W511
Revision cemented	W493
Revision uncemented	W503
Revision nec	W513
Total shoulder replacements	
Primary cemented	W521Z813
Primary uncemented	W531Z813
Primary nec	W541Z813
Revision cemented	W523Z813
Revision uncemented	W533Z813
Revision nec	W543Z813

PROFORMA 1 Proforma used to collect data on patients having a shoulder arthroplasty

Surgeon's initials/hospital number/side	_____
DOB	_____
Sex	_____
Diagnosis	_____
Date of surgery	_____
Grade of surgeon	_____
Rotator cuff status	_____
Significant glenoid deficiency	_____
Implant used	_____
Details of humeral component	Cemented Y/N
Glenoid replaced Y/N	Cemented Y/N
Associated procedures performed	_____
Intra-operative problems Y/N	_____
Complications	_____

PROFORMA 2 Proforma used to collect postoperative

Pain

1. Do you have any pain during normal day-to-day activities in your shoulder? Y/N
2. Would you describe the pain you experience in your shoulder as mild, moderate or severe?

Sleep

With regard to shoulder pain at night, would you say that?

1. My sleep is undisturbed by my shoulder
2. My sleep is disturbed, but overall I manage a reasonable night's sleep
3. My shoulder regularly disturbs my sleep

Activity

When you are using your arm and hand, to which level can you place your hand for useful activity without experiencing pain?

To the level of my waist/the front of my chest/
my neck/the top of my head/above my head.

Opinion

With regard to the results of your shoulder replacement, do you feel?

Pleased/satisfied/disappointed

Table 2 Diagnostic indications for shoulder arthroplasty

Inflammatory arthritis	184 cases
Fractures humerus head/neck	
<i>Acute (within 2 weeks)</i>	86 cases
<i>Chronic (> 2 weeks)</i>	49 cases
Osteoarthritis	87 cases
Avascular necrosis	27 cases
Revision	9 cases
Fractures + arthritis	9 cases

(range, 2–79). A total of 451 shoulder arthroplasties were registered over a 5-year period. Of patients, 23.2% were male and 76.8% female. The mean age was 65 years (range, 37–90 years). Shoulder arthroplasty was most commonly performed for rheumatoid arthritis followed by trauma, osteoarthritis and avascular necrosis of the humeral head (Table 1). Overall, 397 (88%) patients had a hemi-arthroplasty and 54 (12%) had a total shoulder replacement. Of the 54 cases that had a glenoid replacement, 28 were performed for inflammatory arthritis, 21 for osteoarthritis and 5 were for revisions. The humeral component was cemented in 204 (45%) cases, 160 of whom had a shoulder replacement for trauma. The glenoid component was cemented in 48 (89%) cases. Information of the rotator cuff was available in 404 cases. The rotator cuff was found to be normal in 194 cases (48%) and thin or torn in 210 cases (52%). The rotator cuff was repaired in 26 cases (12%). Associated procedures were performed in 85 cases (Table 2).

Table 3 Associated procedures performed at time of shoulder arthroplasty

Rotator cuff repair	26 cases
Coracoacromial ligament excision	43 cases
Coracoid osteotomy	14 cases
Acromioclavicular ligament excision	2 cases

The consultant in 425 cases and the trainee in 26 cases performed the operation. Surgeons who performed 3 or fewer shoulder arthroplasties a year performed 30% of the cases (Fig. 1).

There were 24 (5%) intra-operative complications and 9 (2%) patients had a revision. Of these 9 patients, 6 patients had a revision within 3 years and 3 patients within 5 years of their primary surgery. Five of these patients were revised to a total shoulder arthroplasty from a hemi-arthroplasty. Subjectively, 61% of patients were pleased, 23% satisfied and 16% disappointed with their results (Table 3).

Cross referencing our data with the data from the Information and Statistics Division in Scotland (Fig. 2), we found that 25/200 shoulder arthroplasties performed in 1996, 91/225 cases in 1997, 167/315 cases in 1998, 85/260 cases in 1999 and 41/255 cases in 2000 were registered in our registry.

Discussion

Shoulder arthroplasties are technically difficult and, therefore, have a greater potential for technical errors and

Figure 1 Surgeons performing shoulder arthroplasties in Scotland between July 1999 and June 2000.

Figure 2 Comparison of the number of shoulder arthroplasties registered in the Scottish shoulder arthroplasty registry with the figures of the actual number of shoulder arthroplasties performed in Scotland.

complications.² New implants in the market, with the current systems being modular, attempt to make it easier for the surgeon to allow accurate coverage of the humeral

head consistently and also establish correct soft tissue tension and balance. It is, therefore, essential that these implants be closely monitored.

As shown previously,^{1,3,4} the goals of a national arthroplasty registry are 3-fold. First, it should accurately define the epidemiology of arthroplasty surgery in a particular patient population. This information on the number and type of prostheses that are being implanted is vital in understanding the impact of reported failures. The second goal is to provide timely information to the orthopaedic community on the outcomes of arthroplasty (Table 4). Since information is gathered in real time, it is easier to identify potential problems long before they are reported by conventional methods. The third goal is to identify risk factors for poor outcome related to the patient, implant or surgical technique with the view to improving outcomes by continuous feedback to the participating surgeons.

Our registry did provide information on the epidemiology of shoulder arthroplasty. It also highlighted the fact that the shoulder surgeons in Scotland more commonly performed hemi-arthroplasties. A recent randomised control trial,⁵ which compared hemi-arthroplasties with total shoulder replacement for patients with degenerative osteoarthritis, however, concluded that total shoulder replacements provided superior pain relief compared with a hemi-arthroplasty. Another recent study⁶ on 6 patients with osteoarthritis secondary to glenoid dysplasia noted that the 3 patients who had a hemi-arthroplasty required a revision to a total shoulder arthroplasty within 3 years. The only patient whose hemi-arthroplasty was not converted to a total shoulder replacement had a glenoid osteotomy performed at the

Table 4 Outcome of patients who had a shoulder arthroplasty

Pain postoperatively	
No pain	221 (49%)
Mild pain	81 (18%)
Moderate pain	68 (15%)
Severe pain	81 (18%)
Sleep	
Undisturbed	289 (64%)
Occasionally disturbed	81 (18%)
Regularly disturbed	81 (18%)
Activity (level to which arm and hand could be placed without experiencing pain)	
Waist	45 (10%)
Front of chest	63 (14%)
Neck	113 (25%)
Top of head	90 (20%)
Above head	140 (31%)
Opinion	
Pleased	275 (61%)
Satisfied	104 (23%)
Disappointed	72 (16%)

time of the hemi-arthroplasty. Knowledge of the current practice obtained from the registry could, therefore, in theory help disseminate information to the contributing surgeons. The registry also provided valuable information on complications and satisfaction levels of patients.

Although the benefits of a shoulder arthroplasty registry are obvious, the value of a joint registry is dependent on accuracy and completeness of the data entered. Compliance is a big problem with any registry, even the Swedish registry, one of the oldest quality registers in the world, reporting a delay in dissemination of information from their registry due to pending data collection.³ Running a total joint registry that collects detailed information is time consuming and costly. The Mayo Clinic spends about \$400,000 annually to maintain its registry.⁴ This registry employs dedicated personnel for data collection, validation and ensuring compliance from the participating surgeons.

Our registry relied on the voluntary contributions from all the shoulder surgeons in Scotland. It also relied on a single surgeon (CRD) to collect, collate and provide annual feedback to the individual contributing surgeons. Contributions to the registry increased from 12% of all shoulder arthroplasties performed in the first year of the registry to 53% in the third year. However, this impetus could not be maintained through a voluntary data registration alone. Owing to financial and time constraints, the annual meeting in the 4th year of the registry was cancelled. This led to a drop in the percentage of shoulder arthroplasties registered over the next 2 years so that in the 5th year of the registry only 18% of the shoulder arthroplasties performed were registered.

The other factor for the poor percentage of registration was that orthopaedic surgeons who had no declared interest in shoulder arthroplasty were increasingly performing shoulder arthroplasties. Shoulder surgeons who performed 3 or fewer shoulder arthroplasties were performing 30% of the shoulder arthroplasties. A large majority of the cases were for fractures of the proximal humerus. The voluntary registrations of data in our registry depended on a small group of dedicated shoulder surgeons who were keen to

evaluate their performance and were motivated, albeit for a short spell, to contribute to the shoulder registry. It was logistically difficult to target all the orthopaedic surgeons in Scotland and motivate them to contribute voluntarily to the registry.

In the UK, the development of a national registry was mandated by the government in response to a recent problem with a hip replacement system which had an exceedingly high failure rate and was subsequently recalled.

With the numbers of shoulder being replaced on the increase, we believe that a shoulder registry can be as useful as a hip registry and, therefore, propose that the national joint registry should be extended to include shoulder arthroplasties as well.

Conclusions

Through the initiative, motivation and hard work of a small group of orthopaedic surgeons, registration of about 50% of shoulder arthroplasties is possible. However, to maintain the impetus to data collection and also to ensure consistently high registration numbers, we believe that a registry can only function through dedicated data collection, data collation and statistical teams.

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