

Duration of sick leave after shoulder arthroscopy in Germany: analysis of health care data

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Abstract

Introduction The expected duration of incapacity after arthroscopic shoulder surgery is an important factor for therapy planning. The aim of this study was to analyze the duration of sick leave after arthroscopic shoulder surgery in Germany and to identify factors associated with a longer duration of sick leave. We hypothesized that certain patient-related factors may be associated with a longer duration of sick leave.

Methods Routine health care data of all patients insured by one German health insurance company who underwent inpatient arthroscopic shoulder surgery between 2010 and 2012 were included in the analysis of the duration of sick leave in this retrospective cohort study (level III evidence). Comparisons were performed for different arthroscopic surgical procedures using the log-rank test. Possible factors that might be associated with a longer duration of incapacity were analyzed.

Results Sick leave was reported in 303 of 660 cases. The median duration of sick leave was 82 days after subacromial decompression and 157 days after rotator cuff repair ($p = 0.004$). The duration of sick leave was longer in patients older than 50 years ($p = 0.044$) and in patients with sick leave that started prior to surgery ($p < 0.001$). Patients not receiving physiotherapy had a longer period of sick leave ($p = 0.058$). The median period of prescribed physiotherapy (64 days) was shorter than the period of incapacity. The duration of disability was not notably longer in female patients, patients taking opioid or antidepressant medication or diabetics.

Conclusions The duration of sick leave after arthroscopic shoulder surgery in Germany does not exceed sick leave duration in other countries. More complex procedures, advanced age and sick leave beginning prior to surgery resulted in longer durations of sick leave. Preoperative prognosis of the necessary duration of postoperative sick leave may not always be realistic. An extended period of sick leave can be expected after more complex procedures and in patients older than 50 years of age. Future studies should investigate whether a longer period of physiotherapy may help to shorten the period of postoperative sick leave.

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Introduction

About 160,000 inpatient arthroscopic shoulder surgeries were performed in Germany in 2013 [1]. The expected duration of incapacity after arthroscopic surgery of the shoulder is an important factor in therapy planning. Loss of

income for patients, manpower losses for employers and increased costs for health care insurance companies are some of the consequences of prolonged periods of incapacity. International data on disability after arthroscopic shoulder operations are described in the scientific literature [2]. The period of incapacity was shown to be on average up to 3 months after arthroscopic acromioplasty and on average up to 9 months after arthroscopic rotator cuff repair [3–11]. To the authors' knowledge, so far there have not been any detailed scientific studies on the duration of incapacity after arthroscopic shoulder surgery in the German health care system. The aim of this study was to analyze the period of incapacity after arthroscopic shoulder surgery based on routine data from one statutory health insurance. It was assumed that more complex interventions were associated with a longer duration of incapacity.

Materials and methods

Data source

This retrospective cohort study (level III evidence) was based on routine data from the AOK Bremen/Bremerhaven health insurance company which is included in the German Pharmacoepidemiological Research Database (GePaRD). GePaRD comprises information about hospitalizations and outpatient medical prescriptions. Inpatient and outpatient diagnoses were coded according to the German Modification of the International Classification of Diseases 10th Revision (ICD-10 GM). Outpatient medical prescriptions were characterized by the central pharmaceutical number, which was linked to the corresponding anatomical-therapeutic-chemical (ATC) code. The database has been described in detail in a previous study [12]. Additional information on sick leave as well as prescriptions (including physiotherapy) and medical adjuvants was available in the routine data of the AOK Bremen/Bremerhaven. By combining the information in GePaRD with the data on sick leave and prescriptions, it was possible to analyze individual postoperative courses. The routine data were pseudonymized and the data transfer was approved by the responsible supervisory authority of the federal state.

Study cohort

Inpatients with a diagnosis of shoulder disease in combination with an arthroscopic shoulder operation in the years 2010, 2011 and 2012 were included in the study (Table 1).

Cohort entry was the day of the index operation. Cohort exit was the end of the individual insurance period (including death) or the end of the study (31st December 2012).

Patients who had undergone shoulder arthroscopy on the same shoulder within 2 years prior to cohort entry were excluded from the cohort. To obtain a more homogeneous collective, patients with trauma-related diagnoses, i.e., bone fractures/dislocations (ICD-10 GM S40-49) or instabilities (ICD-10 GM M25.31) were excluded from the cohort. A sub-cohort of patients reported to be on sick leave after surgery was formed.

All patients were grouped according to their main operation: 1. patients with arthroscopic subacromial decompression, 2. patients with arthroscopic reconstruction of the rotator cuff, 3. patients with capsulotomy without tendon reconstruction and 4. other patients.

Duration of sick leave and associated factors

The duration of sick leave was determined for the first continuous episode of sick leave after surgery. Episodes of sick leave with a gap of 14 days were combined. The duration of physiotherapy was ascertained for the first continuous episode of physiotherapy after surgery. Physiotherapy application was considered continuous if the gap between two consecutive prescriptions was shorter than 14 days.

Prescriptions of opioids (ATC code N02A), antidepressants (ATC code N06A), insulin (ATC code A10A) or oral antidiabetic drugs (ATC code A10B) were ascertained in a time window of 6 months before cohort entry. It was hypothesized that intake of these medications was associated with a prolonged healing process and was thus associated with longer sick leave. Patients with a prescription of an oral antidiabetic drug or insulin in the 6 months prior to cohort entry were considered diabetic patients. An exploratory analysis was carried out to identify other factors possibly associated with a longer duration of incapacity.

Statistical analysis

The duration of sick leave was determined using a Kaplan–Meier estimate. For statistical analysis SAS 9.3 Software (SAS Institute Inc., NC, USA) was used. Median, first quartile (Q1) and third quartile (Q3) of the estimated duration were calculated. The duration of sick leave was compared between patients who underwent subacromial decompression and patients who underwent reconstruction of the rotator cuff using a log-rank test. Analyses were carried out for additional risk factors, i.e., statistical tests were performed without adjusting for multiple testing. We therefore report the respective *p* values in the results, but the identified factors cannot be considered as causative. The duration of sick leave was compared between (1) patients with and without the ability to work prior to surgery, (2) patients with and without a prescription for physiotherapy after surgery, (3) patients younger and older

Table 1 Shoulder diseases and related procedures

Diagnosis (ICD-10 GM)	Shoulder surgery (OPS)
Rotator cuff tear (M75.1)	Reconstruction of the rotator cuff (5-814.4)
Impingement syndrome of shoulder (M75.4)	Decompression of the subacromial space (5-814.3)
Calcific tendinitis of shoulder (M75.3)	Calcium removal (5-810.50)
Arthrosis of the acromioclavicular joint (M19.91)	Resection of the acromioclavicular shoulder joint (5-814.a)
Frozen shoulder (M75.0)	Capsulotomy (5-810.20)

ICD-10 GM German Modification of the International Classification of Diseases 10th Revision, OPS codes for the reimbursement of inpatient procedures (operations and procedures key)

Table 2 Demographic characteristics

Variable	Overall cohort (N = 660)	Sub-cohort (N = 303)
Sex		
Male	330 (50.0 %)	176 (58.1 %)
Female	330 (50.0 %)	127 (41.9 %)
Age in years		
Mean (sd)	56.2 (11.2)	50.1 (7.7)
<30	5 (0.8 %)	4 (1.3 %)
30–<50	186 (28.2 %)	130 (42.9 %)
50–<70	376 (57.0 %)	169 (55.8 %)
≥70	93 (14.1 %)	0 (0.0 %)
Time in cohort in days		
Mean (sd)	577.7 (311.7)	553.1 (313.9)
<365	201 (30.5 %)	100 (33.0 %)
365–730	221 (33.5 %)	103 (34.0 %)
≥730	238 (36.1 %)	100 (33.0 %)
Occupation		
Trainee	1 (0.2 %)	0 (0.0 %)
Worker	183 (27.7 %)	33 (10.9 %)
Foreman	7 (1.1 %)	3 (1.0 %)
Employee	207 (31.4 %)	180 (59.4 %)
Homeworker	0 (0.0 %)	0 (0.0 %)
Part-time worker	174 (26.4 %)	85 (28.1 %)
Unknown	88 (13.3 %)	2 (0.7 %)

than 50 years of age, (4) female and male patients, (5) patients with and without diabetes, (6) patients with and without prescriptions of opioids before surgery and (7) patients with and without prescriptions of antidepressants before surgery.

Results

Between 2010 and 2012, an inpatient arthroscopic shoulder procedure was performed on 660 patients. The overall cohort comprised 330 female (50 %) and 330 male (50 %)

patients. The mean age was 56.2 years. Further characteristics of the overall cohort are shown in Table 2. A revision operation on the same shoulder was carried out in 25 patients: three capsulotomies (12 %), 19 revision subacromial decompressions (76 %), two reconstructions of the rotator cuff (8 %) and one resection of the acromioclavicular joint (4 %).

The sub-cohort with postoperative sick leave included 303 of the 660 patients and comprised more male (58.1 %) and younger patients (mean age: 50.1 years) than the overall cohort. Further characteristics are given in Table 2. In the sub-cohort, 226 subacromial decompressions (74.6 %), 38 reconstructions of the rotator cuff (12.5 %), 23 capsulotomies (7.6 %) and 16 other shoulder surgeries (5.3 %) were carried out as the main procedure (Table 3). The distribution of the main procedures was similar to the distribution of the main procedures in the overall cohort.

In the sub-cohort, sick leave lasted for a median duration of 92 days (Q1 = 53 days, Q3 = 158 days). The median duration of sick leave was 82 days (Q1 = 48 days, Q3 = 136 days) for patients with a subacromial decompression, 157 days (Q1 = 101 days, Q3 = 206 days) for patients with a rotator cuff repair and 101 days (Q1 = 47 days, Q3 = 196 days) for patients with a capsulotomy. Physiotherapy was prescribed for a median duration of 64 days (Q1 = 46 days, Q3 = 89 days).

Comparison: subacromial decompression vs. reconstruction of the rotator cuff

The log-rank test revealed a significant difference in the duration of sick leave between patients with a subacromial decompression and patients with a reconstruction of the rotator cuff ($p = 0.004$). The Kaplan–Meier curve in Fig. 1 shows that the proportion of patients with sick leave in the first six postoperative months was much lower after subacromial decompression than after reconstruction of the rotator cuff, whereas the proportion of patients with an extended duration of sick leave (>7 months) was similar between the two groups.

Age and sex

The median duration of sick leave was 98 days (Q1 = 58 days, Q3 = 168 days) for female and 89 days (Q1 = 49 days, Q3 = 150 days) for male patients ($p = 0.114$).

Patients younger than 50 years ($n = 149$) had a median duration of sick leave of 78 days (Q1 = 47 days, Q3 = 143 days), whereas patients older than 50 years ($n = 154$) had a median duration of sick leave of 104 days (Q1 = 61 days, Q3 = 181 days) ($p = 0.044$).

Ability vs. inability to work prior to surgery

In patients able to work prior to surgery, sick leave lasted for a median duration of 55 days (Q1 = 38 days, Q3 = 94 days) after surgery. In contrast, patients who were already unable to work prior to surgery ($n = 196$) had a median duration of sick leave of 113 days (Q1 = 74 days, Q3 = 201 days) ($p < 0.001$).

Physiotherapy vs. no physiotherapy

Patients with physiotherapy after surgery ($n = 243$) had a median duration of sick leave of 89 days (Q1 = 48 days, Q3 = 150 days), whereas patients without a prescription

for physiotherapy ($n = 60$) were reported on sick leave for 111 days (Q1 = 61 days, Q3 = 200 days) ($p = 0.058$).

Diabetes

The median duration of sick leave in patients with diabetes ($n = 27$) was 66 days (Q1 = 40 days, Q3 = 105 days) and 94 days (Q1 = 56 days, Q3 = 166 days) in patients without diabetes ($n = 276$) ($p = 0.197$).

Opioids

The median duration of sick leave was 151 days (Q1 = 67 days, Q3 = 311 days) in patients with prescriptions of opioids ($n = 47$) and 91 days (Q1 = 53 days, Q3 = 157 days) in patients without prescriptions of opioids preoperatively ($n = 256$) ($p = 0.205$).

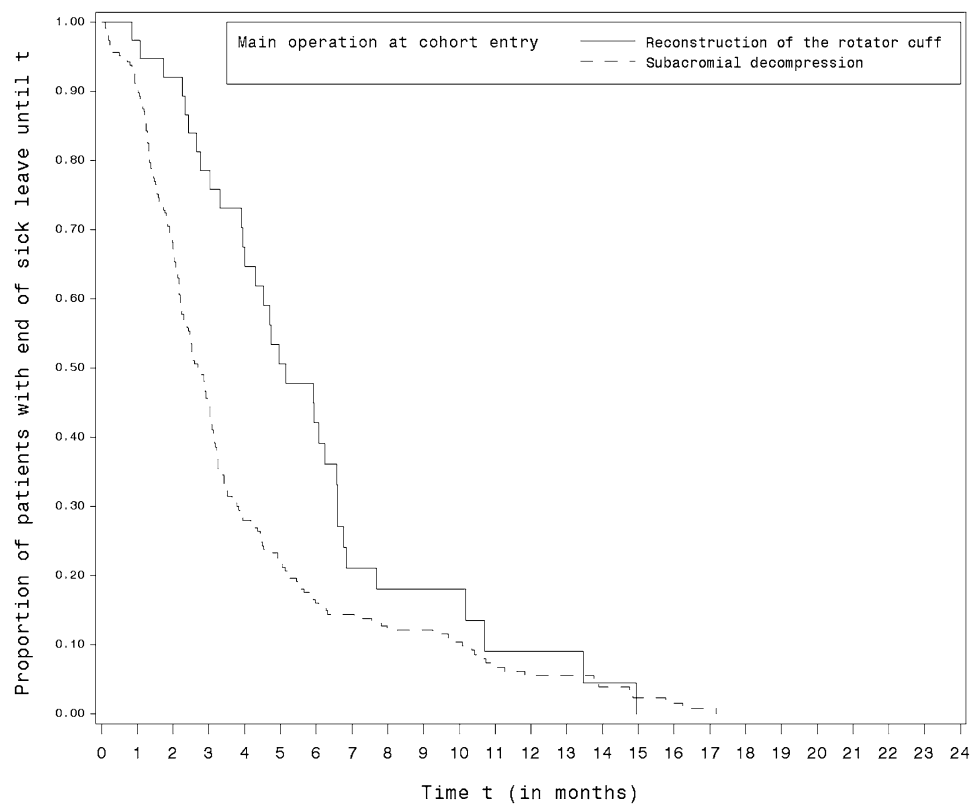
Antidepressants

The median duration of patients with prescriptions of antidepressants ($n = 31$) was 92 days (Q1 = 61 days, Q3 = 143 days) and coincided with the median duration of sick leave (Q1 = 53 days, Q3 = 166 days) in patients without prescriptions of antidepressants preoperatively ($n = 272$).

Table 3 Procedures at cohort entry

Main procedure	Combined procedures	Overall cohort ($N = 660$)	Sub-cohort ($N = 303$)
Subacromial decompression	Subacromial decompression	459 (69.6 %)	226 (74.6 %)
Reconstruction of the rotator cuff	Reconstruction of the rotator cuff	132 (20.0 %)	38 (12.5 %)
	Reconstruction of the rotator cuff + subacromial decompression	105 (15.9 %)	30 (9.9 %)
	Reconstruction of the rotator cuff	22 (3.3 %)	5 (1.6 %)
	Reconstruction of the rotator cuff + subacromial decompression + resection of the acromioclavicular joint	4 (0.6 %)	2 (0.7 %)
	Reconstruction of the rotator cuff + resection of the acromioclavicular joint	2 (0.3 %)	1 (0.3 %)
	Reconstruction of the rotator cuff + subacromial decompression + capsulotomy	2 (0.3 %)	
Capsulotomy	Reconstruction of the rotator cuff + capsulotomy	1 (0.2 %)	
	Capsulotomy	42 (6.4 %)	23 (7.6 %)
	Subacromial decompression + capsulotomy	12 (1.8 %)	10 (3.3 %)
Other surgeries		30 (4.6 %)	13 (4.3 %)
	Subacromial decompression + resection of the acromioclavicular joint	23 (3.5 %)	16 (5.3 %)
	Subacromial decompression + calcium removal	13 (2.0 %)	9 (3.0 %)
	Resection of the acromioclavicular joint	4 (0.6 %)	2 (0.7 %)
	Calcium removal	3 (0.5 %)	3 (1.0 %)
		3 (0.5 %)	2 (0.7 %)

Fig. 1 Kaplan–Meier curve for the end of the sick leave in the sub-cohort



Discussion

The duration of incapacity after arthroscopic acromioplasty with a median of 82 days or after arthroscopic rotator cuff repair with a median of 157 days was not longer than that reported in the international literature for other comparably developed countries (Australia, Belgium, France, Canada, USA) [3–11].

Sick leave lasted considerably longer in patients who were older than 50 years compared to younger patients. This may not be due to poorer local healing tendency after arthroscopic shoulder surgery, as there are indications in the literature that tendon healing and functional outcome in elderly patients are not necessarily worse than in younger patients [13]. This is more likely to be dependent on the overall constitution of the elderly. It is known from the literature that the period until a normal level of activity is reached after arthroscopic repair of the rotator cuff may be extended in female patients compared to male patients [14]. In our study, we noticed only a slightly longer disability in female compared to male patients. The duration of disability was also not noticeably longer in patients who took opioids, antidepressants or who had diabetes. Compared with the literature, which shows that the results after arthroscopic repair of the rotator cuff can be worse in diabetics [15], it is surprising that in our study a longer period of incapacity was not observed for these patients. Further analyses showed that

11 out of 27 (40.7 %) patients with diabetes were declared unfit for work prior to surgery compared to 185 patients without diabetes (62.7 %). The slightly shorter duration of incapacity in diabetics was thus possibly a result of the less frequent sick leave prior to surgery in these patients, and not associated with the disease itself.

An exploratory evaluation of the websites of shoulder surgeons in Germany showed that the expected duration of incapacity was often anticipated to be considerably shorter than actually observed in our study based on health care data. It seems reasonable to inform patients more realistically about the expected duration of sick leave, pointing out that longer duration is possible, especially in patients older than 50 years, and especially after more complex rotator cuff repairs. Extended periods of disability of even more than 1 year may occur.

Our study found evidence that prescribed physical therapy was associated with a shorter duration of incapacity. However, no causal relationship between the duration of physiotherapy and sick leave can be assessed based on our data. It may still be possible that an extended prescription of physiotherapy would lead to a shorter period of incapacity. It therefore seems reasonable to review prescribing practices and patterns in future studies. Intuitively, it seems to be reasonable to adjust the duration of prescribed physiotherapy to the expected duration of incapacity.

A capsulotomy is sometimes indicated for frozen shoulder when the natural course of the disease with likely regression of symptoms within 15 months [16] cannot be expected. The median duration of incapacity of 101 days after capsulotomy observed here may facilitate the patient's decision for or against surgery. If the expected duration of incapacity due to frozen shoulder exceeds 3 months, a surgical procedure may be indicated.

Limitations of the study

A weakness of this study is that procedures performed on an outpatient basis were not included in the present analysis. However, the period of incapacity is probably not markedly influenced by inpatient or outpatient status.

Another potential weakness is that an analysis regarding the patients' professional activities and their impact on the duration of the disability was not feasible based on the health care data analyzed in this study. However, it is already known that heavy physical work can lead to a longer period of incapacity [5, 7, 10, 11].

A study population comprising the patients of only one health insurance company may be a potential limitation of this study implying that potential regional differences in Germany cannot be excluded definitively. Comparable analyses based on data from different health insurances would therefore be desirable, even if we do not assume that the restriction to one statutory health insurance in this study has necessarily led to a selection bias.

Conclusions

The expected duration of incapacity after arthroscopic shoulder surgery in Germany is not longer than in other developed countries, but may not always be assessed realistically by clinicians. Further studies should be undertaken to clarify whether a longer duration of prescribed physiotherapy after surgery might help shorten the period of incapacity.

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