

Higher rate of compensation after surgical treatment versus conservative treatment for acute Achilles tendon rupture

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ABSTRACT

INTRODUCTION: Acute Achilles tendon rupture (ATR) can be treated either surgically or non-surgically. High-quality meta-analyses show a lower re-rupture rate, but a higher overall complication rate among surgically treated patients. No studies have evaluated the socio-economic impact of different complications. The aim of this study was to investigate: 1) the socio-economic impact of complications after ATR through the utilisation of the Danish Patient Insurance Association (DPIA) database, 2) correlations between treatment and complications.

METHODS: A total of 324 patients with ATR reported in the period from 1992 to 2010 in the DPIA database were identified and patient records were reviewed manually.

RESULTS: The compensation awarded for the 18-year period totalled 18,147,202 DKK with 41% of patient claims being recognised. Out of 180 surgically treated patients, 79 received a total compensation of 14,051,377 DKK, median 47,637 (range: 5,000-3,577,043). Of 114 non-surgically treated patients, 40 received 3,715,224 DKK in compensation, with a median amount of 35,788 DKK (range: 5,000-830,073).

CONCLUSION: Compensation after surgical treatment was 3.8 times higher than compensation after non-surgical treatment. It is noteworthy that 34.5% of patients had an overlooked diagnosis which underlines the importance of a correct primary diagnosis.

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Acute Achilles tendon rupture (ATR) is a frequent and potentially disabling injury that typically occurs among young active adults (11-37 per 100,000 per year) [1-3]. High-quality meta-analyses comparing surgical and non-surgical treatment have been unable to show statistically significant differences in functional and patient-reported outcomes [4-9]. The only statistically significant differences were found in the complication profiles showing a lower re-rupture rate, but a higher overall complication rate among surgically treated patients [4-9]. Rates of re-rupture are approximately two to three times greater in non-surgical than in surgical treatment [7, 10], whereas infections, skin adhesions and disturbed

skin sensation are found only in operatively treated patients [4-9]. Tendon elongation occurs irrespective of treatment choice; however, higher rates have been found in non-surgically treated patients [11]. Although several studies have investigated venous thromboembolisms (VTE) following ATR, uncertainty remains regarding incidence and patient impact due to overlaps between symptomatic and clinically silent cases [11]. In 2002, Pajala et al investigated the association between re-rupture, deep infection and patient outcome. Their results showed significantly increased isokinetic muscle-calf strength in the re-rupture group [12]. Furthermore, in the re-rupture group, all patients (23/23) returned to recreational sports in contrast to only 33% (3/9) from the deep infection group [12]. There is, however, still insufficient evidence concerning the severity of the different complications, and studies evaluating the socio-economic impact of the complications are lacking.

This retrospective registry study aimed to gain insight into the socio-economic impact of complications after ATR through the utilisation of the Danish Patient Insurance Association (DPIA) database. The DPIA treats claims from patients who have been injured in private or public Danish health care. The rulings are based on the Danish Act on the Right to Complain and Receive Compensation within the Health Service and the Danish Liability for Damages Act [13]. Claim recognition is processed by a review group consisting of medical doctors and legal attorneys who use a standardised set of formulas and rules to identify claim validity and respective compensation amount. In 2012 with a claims recognition ratio of 32.8%, the DPIA awarded 781 million DKK in compensation [14].

METHODS

This retrospective registry study examined the DPIA database records from 1992 to 2010. We identified 324 patients with ATR. All patient records were manually reviewed, and data were assessed to confirm correct registration of diagnosis and complications. As outlined in **Figure 1**, patients with chronic ATR, sharp ATR, or without ATR type specification were excluded from further analysis. Using Microsoft-Office Access, we constructed

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FIGURE 1

Patient inclusion overview.
ATR = Achilles tendon rupture; DPIA = Danish Patient Insurance Association.

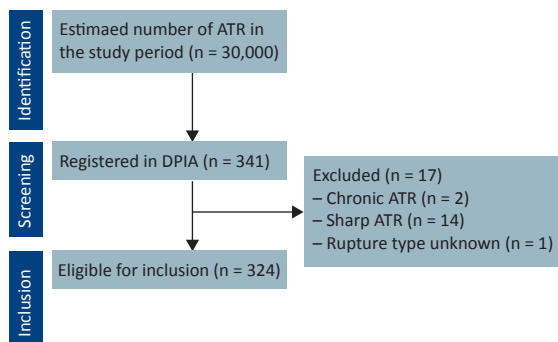
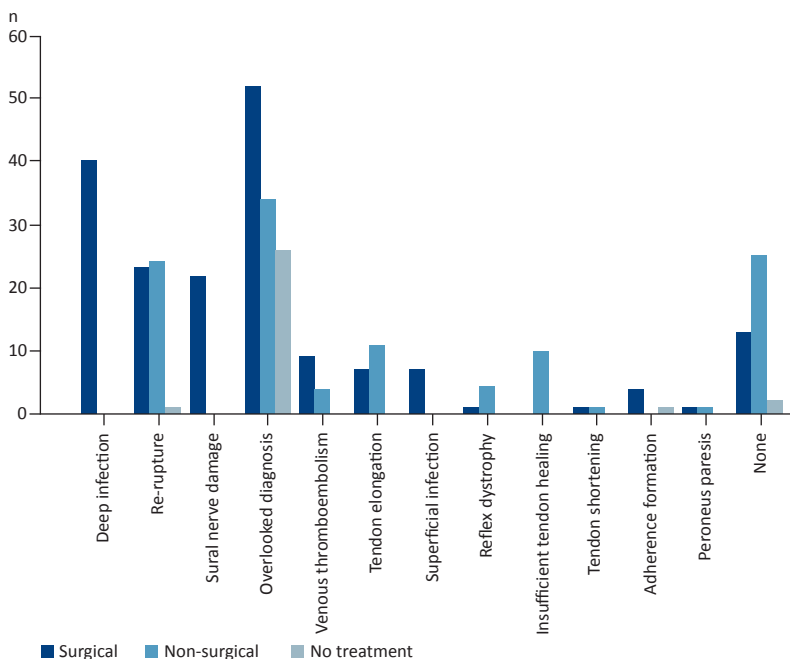


FIGURE 2

Frequency of complications after acute Achilles tendon rupture according to treatment type.



supplementary database compiling all relevant health-care data from patient chart records, external consultant statements, and the DPIA database for insurance and compensation data. The primary endpoint was financial compensation. Covariates were: rupture type, time of injury, time of diagnosis, primary treatment, complications, secondary treatments, previous steroid injection as well as co-morbidities. Complications registered included infections, VTEs, re-ruptures, tendon elongations, sural nerve lesions, reflex dystrophy, insufficient tendon healing, adherence formation, peroneus

paresis, and overlooked diagnoses. In this study, an overlooked diagnosis was defined as a diagnosis made four weeks or later after the primary injury. Compensation was analysed according to treatment type and corresponding complications that occurred. Treatment types were either surgical, non-surgical, or categorised as 'no treatment'. No treatment was predefined as patients with ATR receiving neither conservative nor surgical treatment.

Statistics

As data were not normally distributed, non-parametric statistics were used. IBM Statistical Package for the Social Sciences (SPSS) version 20 was used for data management and analysis.

Trial registration: not relevant.

RESULTS

Over the 18-year period, 134 out of 324 (41%) patient claims were recognised. The compensation awarded totalled 18,147,202 DKK, with a median compensation per recipient of 39,723 DKK (range: 5,000-3,577,043 DKK). The DPIA population pool was comprised of 66% male and 34% female patients with a mean age of 49 (range: 18-83 years).

Co-morbidity

10.5% (34/324) reported previous tendinopathy and 15.1% (49/324) reported steroid injections prior to the rupture. 16.4% (53/324) of patients were smokers and 4.6% (15/324) of patients had diabetes.

Compensation

Out of 180 surgically treated patients, 79 received a total compensation of 14,051,377 DKK, with a median of 47,637 DKK (range: 5,000-3,577,043 DKK). Of 114 non-surgically treated patients, 40 received a total compensation of 3,715,224 DKK, with a median of 35,788 DKK (range: 5,000-830,073 DKK). Patients registered as receiving no treatment received a total compensation of 380,601 DKK with a median of 25,373 DKK (range: 7,412-46,852 DKK).

Complications

In our study, which is limited to the population of patients seeking compensation via the DPIA, surgical treatment reportedly had a higher frequency of complications (92.8%) than non-surgical treatment (78.1%). Among the 180 surgically treated patients, there were 48 infections (40 deep, 8 superficial), 22 sural nerve lesions, 22 re-ruptures, 9 VTEs, six tendon elongations, nine post-operative adherence/scar tissue formations, and 112 patients with overlooked diagnoses (Figure 2).

Among the 114 non-surgically treated patients, there were 24 re-ruptures, 11 tendon elongations, 4 VTEs, and ten patients with insufficient tendon healing.

Evaluation of compensation according to complication type reveals (**Table 1**) that deep infections, re-ruptures, as well as VTEs, received the highest sum as well as the highest median compensation amounts. Deep infections comprised 12% (40/324) of registered patients with 72.5% (29/40) receiving compensation totalling 5,999,388 DKK. Re-ruptures comprised 14.8% (48/324) of registered patients with 39.5% (19/48) receiving compensation totalling 2,343,885 DKK. VTEs comprised 4% (13/324) of registered patients, 38.5% (5/13) of which received compensation totalling 4,602,940 DKK. Although the median compensation was low, overlooked diagnoses comprised 34.5% (112/324) of registered patients, 50% (56/112) of whom received compensation totalling 3,216,553 DKK. Out of the 112 patients with overlooked diagnoses, 52 received surgical treatment, 34 received non-surgical treatment, and 26 received no treatment.

DISCUSSION

Treatment of ATR varies greatly, and the choice of treatment is typically based on complication profiles. In Denmark, the DPIA allocates compensation to patients according to standardised multifactorial evaluation of the severity of sustained injuries and associated complications. Due to the objective nature of this compensation evaluation, the data may predict the socio-economic impact related to the specific treatment modality or complication.

In this study, deep infections following surgical treatment represented 33% of the total compensation sum at 6 million DKK. These high compensation pay-outs indicate a high socio-economic impact of the complication. This is in line with the study by Pajala et al which showed debilitating outcomes after post-operative deep infections following ATR [12].

The results also show an increased rate of tendon elongation and re-rupture in the non-surgically treated patients with compensation amounting to 5% and 13% of the total sum, respectively. However, it should be noted that all types of non-surgically treated patients were grouped together for these calculations, with no differentiation between immobilisation and functional rehabilitation. Current studies have shown an association between functional rehabilitation and decreased rates of both re-rupture and tendon elongation [15, 16].

VTEs comprised over 4.6 million DKK in compensation in our study, which is approximately 25% of the total compensation given. Isolated to the DPIA registry population, VTE is an expensive and severe complication. However, caution should be shown when correlat-

ing to clinical relevance. Due to the highly selective population, patients having either well-treated or asymptomatic VTEs are not represented. Inclusion of these patients would dilute the socio-economic impact of VTEs substantially. Conclusions concerning the cost-benefit of standardised anticoagulant therapy in ATR patients therefore cannot be drawn from this study.

The most common complication in our study was an overlooked diagnosis (35% of the patient pool), with 17.2% of patients receiving compensation totalling three million DKK. Despite a different study setup and another definition of an overlooked diagnosis, the findings of this study are similar to the findings by Inglis et al from 1976 who found that 22% of patients had an initial misdiagnosis [17]. While many complications associated with ATR can be difficult to control and prevent, an overseen diagnosis must be regarded as a fully preventable complication. This stresses the importance of continued information and instruction to primary health care to assure prompt diagnosis recognition and referral to respective orthopaedic and emergency room departments.

In this study, we found that awarded compensation registered in the DPIA amounted to 14 million DKK for surgical treatment and 3.7 million DKK for non-surgical treatment. From a limited cost-effectiveness perspective and looking only at compensation through DPIA, i.e. excluding the additional clinical costs of personnel and equipment, surgical treatment is 3.8 times more expensive than non-surgical treatment in terms of the awarded compensations. Combined with increasing evidence that there is no statistically significant difference in the functional outcome between the two treatments, this study supports current trends of non-surgical treatment [4-9].



TABLE 1

Overview of the first frequency of complications according to complication type after acute Achilles tendon rupture and recognised patient claims from the Danish Patient Insurance Association.

	Patients registered		Compensation, DKK			
	N	recognised, n	median	minimum	maximum	sum
Deep infection	40	29	55,527	10,000	1,815,800	5,999,388
Tendon shortening	2	0				
Adherence formation	5	1	16,589	16,589	16,589	16,589
Peroneus paresis	2	0				
None	40	5	37,600	29,528	39,390	179,906
Re-rupture	48	19	59,700	5,000	547,213	2,343,885
Sural nerve damage	22	8	39,075	15,600	548,514	829,784
Overlooked diagnosis	112	56	32,269	5,000	1,116,924	3,216,553
Venous thromboembolism	13	5	106,250	38,621	3,577,043	4,602,940
Tendon elongation	18	10	42,090	14,600	483,594	926,407
Superficial infection	7	0				
Reflex dystrophy	5	0				
Insufficient tendon healing	10	1	31,750	31,750	31,750	31,750

Complication of a surgically treated Achilles tendon rupture: the picture shows an open avulsion of the Achilles tendon (A) from calcaneus (B). The avulsion most likely occurred due to an adherence (C) from previous surgery of a ruptured Achilles tendon.



Use of the DPIA as a source for alternative clinical research offers new perspectives on patient outcome and can provide supplemental insight into the choice of treatment modalities through cost-effectiveness analyses. Specific to this study, the DPIA not only identified costs associated with treatment type, but also specific compensation pay-outs according to complication type, indicating degree of severity.

The main limitation of this study is the highly selected population of the DPIA. The number of ATR in Denmark in the period from 1992 to 2012 is estimated to approx. 30,000 by the Danish National Patient Register. As our study population consisted of 324 cases, we studied only approx. 1% of the total ATR population. Our study population is biased in that it only consists of patients who sought financial compensation after their injury as opposed to the total number of patients diagnosed with a complication following ATR. Furthermore, the socio-economic impact measured in this study is based on the standardised claims recognition process used in the DPIA, which is nonspecific and has not been validated for ATR.

CONCLUSION

Approximately ten cases of ATR were awarded compensation in the DPIA per year; one third after non-surgical treatment and two thirds after surgical treatment. Total compensation after surgical treatment was 3.8 times higher than compensation after non-surgical treatment, which indicates a higher socioeconomic impact and a higher severity of complications after surgical treatment. It is noteworthy that 34.5% of the patients registered in our study had an overlooked diagnosis; this underlines the importance of a correct primary diagnosis.

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