

CONCISE REPORT

Hip replacement surgery in patients with ankylosing spondylitis

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ABSTRACT**Objectives** Although TNF- α inhibitors' striking effect on clinical symptoms have revolutionised the treatment of ankylosing spondylitis (AS), no certain influence on the development of spinal ankylosis and joint destruction has been documented. We wished to investigate whether improved treatment has affected the use of hip arthroplasty surgery.**Methods** Using the Norwegian Arthroplasty Register, we selected hip prosthesis procedures performed in patients with AS in 1988–2010 (n=534), and compared the trend in the number of procedures being performed annually in 1988–2002 versus 2003–2010. Patients with osteoarthritis (OA) (n=95094) were used as a control group.**Results** The frequency of hip prosthesis surgery increased significantly in both groups up until 2002. In 2003–2010, although not statistically significant (p=0.087), there was a trend towards a reduced frequency in the AS group when compared with the expected continued increase as was seen among patients with OA. Mean age at surgery increased significantly (p<0.001) from 49.9 years to 56.4 years when comparing patients with AS up until and after 2002.**Conclusions** TNF- α inhibitors were introduced to patients with AS in Norway in 2000–2003, and our findings suggest that they may have altered the prognosis by inhibiting or slowing large joint arthritis and thus reducing the need for hip replacement surgery.**INTRODUCTION**

Of patients with ankylosing spondylitis (AS) 24–36% suffer from hip joint arthritis, and patients with severe clinical and radiological hip involvement are more prone to have severe axial disease.¹ One study showed that after more than 30 years' disease 12–25% of patients had at least one replaced hip.¹ Although the long-term results of total hip replacement in young patients with AS are good,² and the prosthesis survival is equivalent to the results in patients with osteoarthritis (OA),³ hip prostheses have a limited life span, and there is a possibility of revision surgery, which carries a higher morbidity and mortality than primary procedures.^{4–5} Consequently, there is a great need for treatment effective in preventing coxarthrosis and subsequent need for hip prosthesis surgery. Studies on patients with AS have shown some benefit of sulfasalazine in the treatment of peripheral arthritis,^{6–7} but a recent Cochrane review did not find enough evidence to support any benefit from

methotrexate.⁸ We have not found any studies on the effect of TNF- α inhibitors on peripheral arthritis in AS.

Histopathological investigations have suggested that hip involvement in AS is mainly caused by inflammation of the subchondral bone marrow.^{9–10} Whereas AS changes of the spine lead to the formation of new bone, rheumatic inflammation of the hip results in an erosive disease which can potentially destroy the joint.^{9–10} It has already been proved that TNF- α inhibitors reduce progression of erosive disease in rheumatoid arthritis,¹¹ but despite the convincing clinical effect of TNF- α inhibitors on patients with AS,¹² spinal radiographic progression has not been found to be inhibited or decelerated when compared with historical controls.¹³ As a replaced hip is considered the most objective proxy for severe end-stage hip involvement,¹ we wished, by investigating the trends in hip replacement surgery in individuals with AS, to study whether the frequency has been affected by the introduction of TNF- α inhibitors in the treatment of this inflammatory rheumatic disease.

PATIENTS AND METHODS

Nearly all patients (98%) receiving a primary arthroplasty of the hip from 1988 until today are registered in the Norwegian Arthroplasty Register.^{14–15} Data concerning the diagnosis was derived from the inclusion form on which AS as reason for hip replacement is a separate option. All patients registered in the Norwegian Arthroplasty Register having undergone a primary total hip arthroplasty due to AS from 1988 until 2010 were identified and included. Primary hip replacement procedures in patients with OA were included, and served as a control group. When more than one diagnosis was recorded we determined AS to overrate OA, and each hip was considered a separate case.

Statistical analysis

Descriptive statistics were used for presentation of the patient characteristics. For the analysis of age the student's t test was used, while χ^2 tests were used when analysing gender distribution. We analysed trends in the absolute number of procedures performed in patients with AS and OA. Incidences (patients with AS with hip arthroplasties per 100 000 patients with AS) were not evaluated since we did not have information on the annual number of patients with AS in the Norwegian population during the study period. For statistical analysis we

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Table 1 Hip replacement procedures

	Ankylosing spondylitis			Osteoarthritis		
	1988–2002	2003–2010	p Value	1988–2002	2003–2010	p Value
n	360	174		53 782	41 312	
Gender (% men)	76	70	0.14	31	32	<0.001
Mean age (years)	49.9	56.4	<0.001	71.0	70.5	<0.001

used Poisson regression models to test for the trend, and change in trend over the years. A random effect was included in the model to account for overdispersion in the data. SPSS software V.18.0 and the R statistical software package were used for the analyses.

RESULTS

In the years 1988–2010, 534 hip replacement procedures (74% men) were performed due to hip involvement of AS, whereas 95 094 procedures (32% men) were performed due to OA (table 1). The cases were divided into two groups according to the year of surgery (1988–2002 and 2003–2010). The segregation was based on the timing of introduction and significant use of TNF- α inhibitors for AS in Norway.

The frequency of hip prosthesis surgery in both groups increased up until 2002 with a coefficient of 0.028/year for patients with OA ($p<0.001$) (figure 1) and a coefficient of 0.039/year for patients with AS ($p=0.002$) (figure 2). Whereas the number of surgical procedures in the OA group continued to rise significantly ($p<0.001$) with a coefficient of 0.017/year in the years 2003–2010, there was a trend towards a reduced frequency (coefficient of -0.022 /year) in the AS group, although the reduction was not statistically significant ($p=0.51$). When comparing the observed falling trend after 2002 to the expected increasing trend during the first period, the difference between the coefficients was -0.061 ($p=0.087$).

When comparing patients with AS before and after 2002, patients operated from 2003 onwards were significantly older

(mean age 56.4 years compared with 49.9 years), whereas among patients with OA, no relevant age difference was found.

DISCUSSION

In the present study, there were two major findings: Mean age at surgery among patients with AS increased significantly from 49.9 years to 56.4 years when comparing patients up until and after 2002, and there was a change of trend in the frequency of hip replacement procedures in patients with AS. Up until 2002 the frequency increased ($p=0.002$) in accordance with the general increase in joint replacement surgery. After 2002 however, there was a tendency of a reduced frequency, instead of the rise that would be expected when comparing with the steadily increasing number of hip prosthesis procedures in patients with OA.

A study on time trends in joint replacement surgery in the years 1994–2004 in patients with inflammatory arthritis, of which the majority (86%) suffered from rheumatoid arthritis found a significant decrease during the entire time span, possibly explained by the use of methotrexate assuming a dominant role in the treatment of inflammatory arthritis during the 1980s and 1990s.¹⁶ In contrast, the annual frequency of hip replacement procedures in patients with AS continued to rise significantly until 2002 before the trend turned, suggesting that the change in this group is caused by a later event.

There has been constancy over time in the epidemiology of AS in a Norwegian study¹⁷ and in a study from Minnesota, USA,¹⁸ making it unlikely that the reduced annual frequency of

Figure 1 Frequency of hip replacement procedures in patients with osteoarthritis.

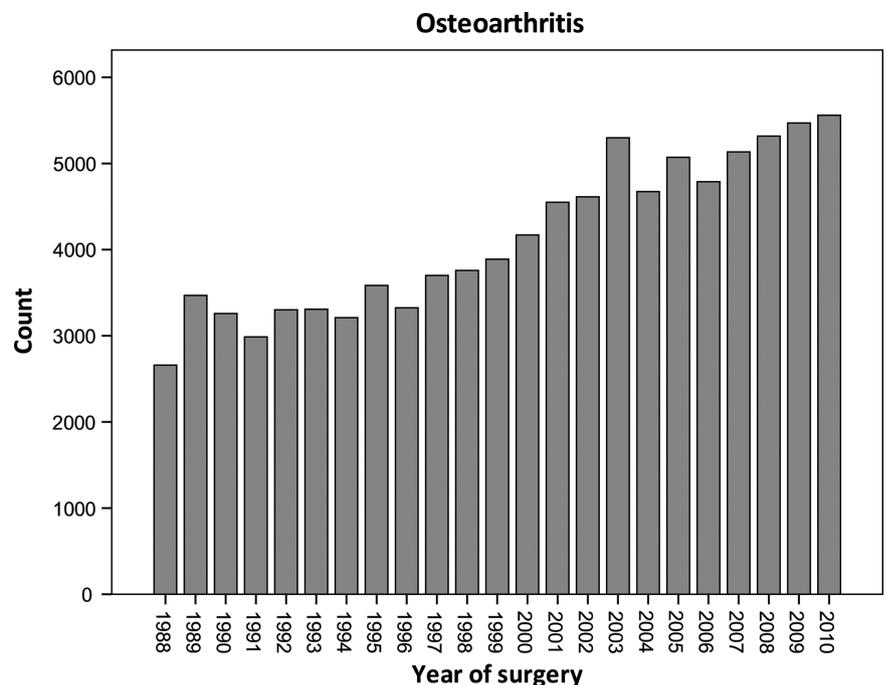
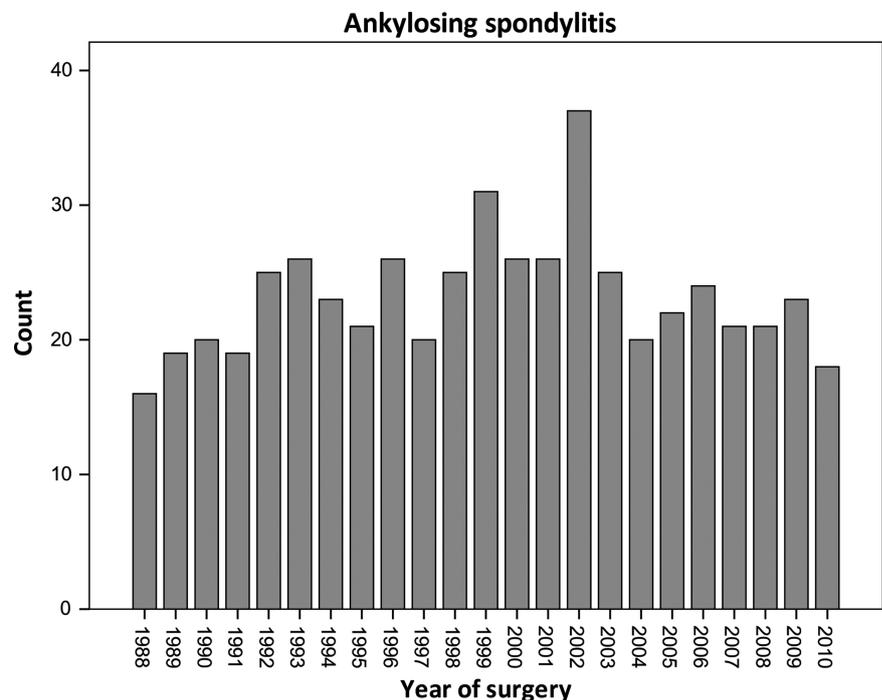


Figure 2 Frequency of hip replacement procedures in patients with ankylosing spondylitis.



surgical procedures can be explained by a reduced prevalence of AS in the Norwegian population.

The inclusion in the register has excellent completeness and coverage nationwide,^{14 15} and AS from the register's beginning being an option in the inclusion form assures that the condition is recorded when present. There is no reason to believe that surgeons have become less aware of the diagnosis during this period.

We found that patients with AS since 2003 have become older when hip prosthesis surgery is being performed, indicating that they suffer from the disease for longer before hip replacement is necessary. Although a generally milder disease or onset of disease later in life during our study period cannot be excluded, environmental factors prone to change over time have not been found to influence disease activity,¹⁹ and the age of onset in previous (1935–1989) years has shown little change.¹⁸ In addition to better medication improving arthritis control thus inhibiting or slowing destruction, one would expect an immediate effect of less inflammation resulting in less symptoms and better function in a destructed joint. This might explain to some extent why the candidates for surgery are becoming significantly older, and also why the change of trend in the number of procedures being performed is seen so soon after the introduction of TNF- α inhibitor treatment.

Continuous use of nonsteroidal anti-inflammatory drugs (NSAIDs) has been shown to influence axial radiographic progression in AS,²⁰ but the inflammation of peripheral joints in AS is structurally different,⁹ and we have not found literature evidence supporting that NSAIDs have any effect in preventing their destruction.

So far, it has been unclear whether TNF- α inhibitors have a prognostic effect on AS.¹³ However, the observed change in trend in the frequency of hip replacement procedures in patients with AS in the present study indicates a recent change in the course of the disease, suggesting a reduced incidence and/or severity of large joint arthritis which coincides with the initiation of TNF- α inhibitor treatment in Norwegian patients with AS.

Strengths and weaknesses

We have not been able to find that others have quantified the diminishing use of prosthesis surgery among individuals with

AS. As a consequence of the relatively low prevalence of AS, the number of patients in the AS group is small, making the visible change in annual frequency less statistically significant, and the results must be interpreted with caution.

CONCLUSION

We observed a significant increase in mean age at the time of surgery (56.4 years to 49.9 years) and a change of trend towards a reduced frequency of hip arthroplasty surgery among patients with AS from 2003 to 2010 which contrasts the increasing trend from 1988 to 2002 in the same diagnostic group, and the increasing trend throughout the period 1988 to 2010 for patients with OA. A possible explanation for these findings is the introduction of TNF- α inhibitors for AS from 2000, which might suggest that TNF- α inhibitors not only improve clinical symptoms, but also inhibit or slow peripheral arthritis in patients with AS.

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Competing interests None.

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Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement This article is a register study on data obtained from the Norwegian Arthroplasty Register which does a continuous registration of aspects regarding prosthesis surgery in Norway. Data from this register may by application be considered available for other research projects.

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