Reviewer's report

Title: Increasing incidence of rotator cuff repairs - A nationwide registry study in Finland

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Reviewer: Andrew Carr

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This manuscript describes an observational cohort study using a national registry of hospital discharges in Finland. Input into this registry is compulsory in Finland. The authors describe the increase in incidence rate of rotator cuff surgery in person-years over a 14 year period between 1998 and 2011. The authors report an increase in rotator cuff repair from 44 to 131 per 10^5 person-years.

Internal validity:
- The study addresses an appropriate and clearly focused question.
- A control group was not presented (perhaps it is appropriate to look at the incidence rate in all surgical procedures in Finland as a comparison for example?)
- The incidence of patients diagnosed with rotator cuff disease/tear/tendinopathy was not calculated which may aid weight to the hypothesis that better knowledge and imaging of cuff pathology led to more rotator cuff repair operations.
- The outcomes are clearly defined.
- It is unclear whether the method of assessment of exposure is reliable. The authors do not present any data or reference previous studies describing the accuracy/validity of the NHDR registry..
- Incidence is assessed more than once (yearly).
- The main potential confounders could not be taken into account in the design and analysis (such as changes in the public/private healthcare infrastructure, changes in percentage of patients’ with private healthcare insurance, changes in the population characteristics, incidence of patients presenting to clinicians with shoulder pain etc.)

Overall assessment:
- The study could not minimise the risk of selection bias as it is a retrospective review of a registry relying on accurate and complete clinical coding of procedures in the entire >18yo population.
It is interesting to note the authors' findings of increasing incidence of rotator cuff repair, however, no meaningful conclusions can be drawn as to the reasons behind this increase.

Additional comments:

- More commentary regarding the validity, completeness, and accuracy of the NHDR needs to be included.
- The distinction of traumatic and non-traumatic cuff tears is not clear and liable to inclusion bias.

Is clinical care and or remuneration influenced in Finland by whether the tear is classified as traumatic or atraumatic?

48% of tears repaired were non-traumatic and 47% were traumatic, which is contradictory to many previously published studies.

- A dramatic 1400% increase in rotator cuff repair during the study period was observed in the private sector. In Finland, it is noted that patients can freely seek private treatment, which is part-funded by the government, private medical insurers, and the patient. Thus, over the 14 year period being studied, the proportion of cases performed in the private sector increased from 9% in 1998 to 47% in 2011.

- This study does not explain this observation, which is likely to be multifactorial, and of interest.

- The authors do comment on the limitation of the clinical coding system in allowing differentiation between arthroscopic and open rotator cuff repair surgery.

- Although liable to inclusion and detection bias this large, nationwide observational study remains an important as it does demonstrate the increase in incidence for rotator cuff repair across a nationwide healthcare system.

Specific points

Line 47 – it would be useful to also point out that not all rotator cuff tears are symptomatic.

Line 58 – proposes an explanation for the increased rates of rotator cuff repairs. This would better be placed in the discussion section. Is there any collected data on increased number of shoulder imaging that could support this.

Line 61 – how does the increase in Finnish rates compare to other reported increases in other countries, such as the USA or the UK.
It is possible that the proportion of traumatic rotator cuff tears has been over-estimated due to the surrogate codes used to identify tears. The authors should explain how ‘distortion or distension of the glenohumeral joint’ was defined and diagnosed as it is a possible source of inclusion bias. Similarly an episode of glenohumeral joint dislocation does not result in a rotator cuff tear in 100% of cases. Why did the authors not simply use the code S46.0 for traumatic rotator cuff tears alone? The authors should provide the breakdown for each of the 3 codes. The 47% of reported traumatic tears represents a higher incidence than in most other studies as the majority of rotator cuff tears are due to degenerative atraumatic aetiology. This was discussed from line 163 onwards.

Statistics. Provision of the incidence rate ratio and 95% confidence interval would be useful to help readers to interpret the data.

The authors should also include data about absolute numbers of rotator cuff repairs with SAD, which could be presented as rates per 105 person-years, rather than simply as percentages.

It is important to note that while the rate of rotator cuff repairs increase was much higher in the private sector, the actual number per 105 person-years was still lower in the private sector (61) compared to the public sector (71). Can the authors provide any data about the total number of procedures performed in the private sector. Possible reasons for discrepancies have been explored in the discussion from line 221 onwards.

Data from the NHDR shows good validity regarding both coverage and reliability and strength of the conclusions.

Limitations – a number of key limitations have been identified.

Acromioplasty may also be performed due to acromial morphology (curved or hooked types) which may be contributing

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests