The choice of treatment of method for unruptured cerebral aneurysm: investigation from clinical outcome, angiographical result, duration of hospital stay, and cost for treatment

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Guglielmi's detachable coil (GDC) embolisation was compared with surgical clipping for the treatment of unruptured cerebral aneurysm.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with a non-giant saccular unruptured aneurysm who were suitable for either direct surgery or GDC embolisation. The patients were treated at the Neurosurgical Department in the authors' setting.

Setting
The setting was secondary care. The economic study was carried out in Japan.

Dates to which data relate
The effectiveness and resource use data were derived between April 1996 and April 2002. The costs seem to have been expressed in 2002/2003 prices.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
Resource use consumption was reviewed retrospectively on a sub-sample of the study sample from the effectiveness analysis.

Study sample
The sample size comprised 90 patients who were treated by surgery or coiling by the investigators from April 1996 to April 2002. No further information on how the sample size was determined was given. However, it would appear that all the cases available at the Neurosurgical Department were reviewed. It was unclear whether the study sample was appropriate for the clinical study question. Seventy-five patients were treated with direct surgery, whereas 15 were treated with GDC embolisation. The majority of the patients were female (47:28 in the direct surgery group and 12:3 in the GDC group). The mean age was 63 years (range: 36 - 78) in the direct surgery group and 59 years (range: 41 - 78) in...
the GDC group.

Study design
This was a retrospective cohort study that was performed on cases treated at the investigators’ hospital. The patients were followed up until hospital discharge. The assessment was not reported to have been conducted blind.

Analysis of effectiveness
The primary outcome used was a composite end point of temporary or permanent complications and death. Angiographical results were also assessed. Complications were defined as temporary when the deficit resolved within one month and returned to the baseline condition, or permanent when the complication was still present after one month. It was unclear whether the groups were comparable since no statistical baseline comparisons were reported.

Effectiveness results
In the direct surgery group, temporary deficits were found in 5 (6.7%) patients whereas permanent complications were seen in 3 (4.0%) patients. No deaths were registered in this group.

The GDC group showed 1 (6.7%) patient with temporary deficits and no deaths.

In the direct surgical group, complete obliteration was seen in 82 aneurysms (88%) and incomplete obliteration in 11 aneurysms (12%), (p=0.015).

In the GDC group, 8 aneurysms (50%) were judged as complete occlusion and the other 8 as incomplete occlusion.

Although the surgery group showed higher morbidity, the difference between the groups was not statistically significant.

Clinical conclusions
The results of the study suggested similar treatment-related complications in both groups. However, the surgery group showed a higher rate of postoperative angiographical complete occlusion.

Measure of benefits used in the economic analysis
No summary measure of health benefit was used in the economic analysis. In effect, a cost-consequences analysis was performed.

Direct costs
A sub-sample of 38 patients from the surgery group and 12 patients from the coiling group was used in the costing analysis. The direct costs related to the health system seem to have been included. These included the costs of the treatment (surgery or coiling), imaging and diagnostics, length of stay on the ward, length of stay in the intensive care unit, drugs, laboratory examination and rehabilitation. The costs and resource use were not reported separately. Length of stay was the only resource use reported in the text. Only the total costs were presented. The unit costs were provided from bills for health insurance. The costs seem to have been expressed in 2002/2003 prices. There was no information on whether discounting was used.

Statistical analysis of costs
The costs were treated stochastically. The groups were compared using parametric and non-parametric techniques when appropriate. Statistical significance was defined at a 5% level.
Indirect Costs
The indirect costs were not included in the analysis.

Currency
Japanese yen (Y).

Sensitivity analysis
As sample data were available, the sensitivity analysis was handled through hypothesis testing. No further sensitivity analysis was described in the text.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The mean total cost was Y2,259,011 (95% confidence interval, CI: 1,487,700 - 4,040,590) for GDC treatment and Y1,684,329 (95% CI: 1,006,040 - 4,731,780) for surgical treatment.

GDC treatment was more expensive but the difference was not statistically significant.

Postoperative hospital stay was significantly longer in the surgery group than in the coiling group.

Synthesis of costs and benefits
The costs and effects were not combined as the analysis was considered a cost-minimisation study.

Authors' conclusions
The analysis of the study showed similar outcome results between the groups, but a higher incidence of incomplete aneurysm occlusion immediately after treatment in the coiling group. Coiling was found to be more expensive than surgery, although the latter had longer postoperative hospital stay. The authors concluded that direct surgery should be considered the first option for unruptured cerebral aneurysm that is suitable for both direct surgery and Guglielmi’s detachable coil (GDC) embolisation.

CRD COMMENTARY - Selection of comparators
The investigators clearly justified their choice of the comparator. GDC embolisation has been demonstrated to be an effective treatment for aneurysms where surgery is not possible. However, for cases where both coiling and surgery are suitable, it is not clear which treatment is more cost-effective. It seems that the comparator represented current practice in the authors' setting. You should decide if this is a widely used health technology in your own setting.

Validity of estimate of measure of effectiveness
The study design would seem appropriate for answering the question about which regimen is more cost-effective. Yet data were available from only one hospital, which resulted in a very small sample size. The sample size does not appear to have been sufficiently large to detect any important differences and, therefore, it is unlikely that it is representative of the study population. The investigators provided little evidence on whether the groups were comparable. These issues may well have an effect on the internal validity of the study.

Validity of estimate of measure of benefit
No summary measure of health benefit was used in the economic analysis. In effect, a cost-consequences analysis was
performed. Please see the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The study seems to have considered the direct costs for the health system. It appears that some relevant categories of costs, such as readmissions, were omitted from the analysis. The analysis only included cost categories relevant up to discharge from the hospital, but it is well known that patients with aneurysms incur important costs after their discharge. It is likely that the final cost results would vary if these omissions were included. The investigators presented little information on resource use and costs. Only aggregate figures were presented in the article. From a decision-making point of view, it would have been helpful to have had detailed information on the costing exercise, as this information would have been available to determine the aggregate final figures. The authors do not appear to have addressed the issue of discounting. It is likely that the time horizon of these patients was above one year, hence discounting would have been needed. The final results could vary if discounting is included. These issues question the internal validity of the costing exercise.

Other issues
The authors did not compare the results of their study with findings from other sources. Although evidence on unruptured cerebral aneurysm is limited, there have been other costing exercises. Generalisability was not addressed although, as mentioned already, the internal validity of the study is weak. The results from the analysis were not presented selectively. The authors did not report any further limitations.

Implications of the study
The authors recommended direct surgery as the first treatment option for patients with unruptured aneurysms who are suitable for both direct surgery and coiling. However, they acknowledged that the analysis of the study was preliminary and that further research is needed to validate these results.

Source of funding
None stated.

Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by CRD

MeSH
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