Haemorrhoidal Artery Ligation Procedure for the Treatment of Symptomatic Grade II-III Haemorrhoids: A Trial-Based and Long-Term Model-Based Economic Evaluation

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OBJECTIVES

- Haemorrhoids are common, with nearly 30000 procedures carried out in England in 2014/15, and result in a significant quality of life burden to patients and costs burden to the National Health Service (NHS) [1].
- The objective of this study was to evaluate the cost-effectiveness of haemorrhoidal artery ligation (HAL) procedure versus rubber band ligation (RBL) for the treatment of symptomatic grade II–III haemorrhoids using data from the HubBLe study, a UK-based, multicentre randomised controlled trial [1].

METHODS

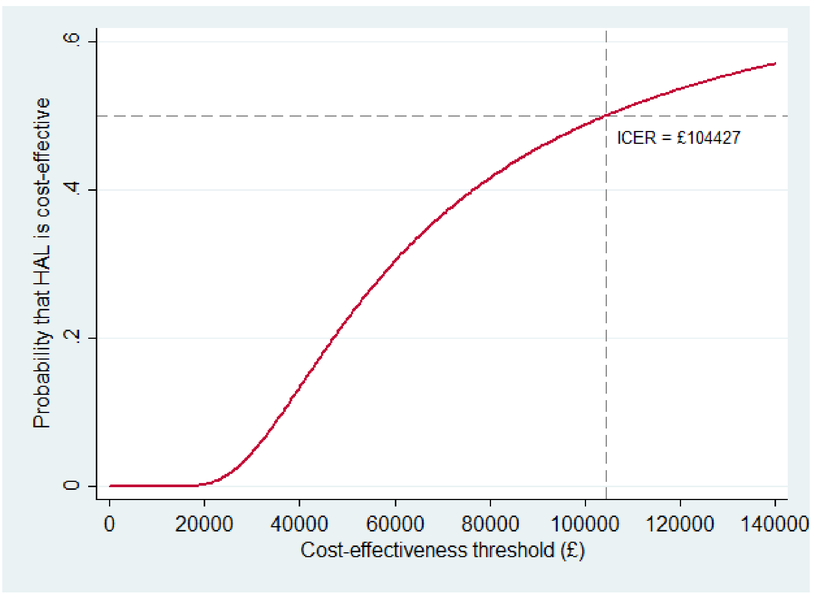
- An economic evaluation (cost-utility analysis) was undertaken from the UK NHS perspective including short-term trial-based and long-term model-based analyses using recommended methods [2,3,4,5].
- In the primary trial-based analysis, a seemingly unrelated regression model was fitted for estimating the mean difference in total cost and quality-adjusted life-years (QALYs) over 12-month time horizon.
- Cost-effectiveness results were expressed in terms of cost per QALY gained and cost per recurrence avoided.
- A parametric analysis and various deterministic sensitivity analyses were performed to address uncertainty around the primary result.
- In the long-term analysis, a three-health-state Markov model was built to extrapolate the analysis for a 4-year time horizon using data from HubBLe (costs, utilities and recurrence) and external studies (long-term recurrence).
- A probabilistic analysis was performed to address uncertainly around the long-term cost-effectiveness result.

RESULTS

Trial-based analysis

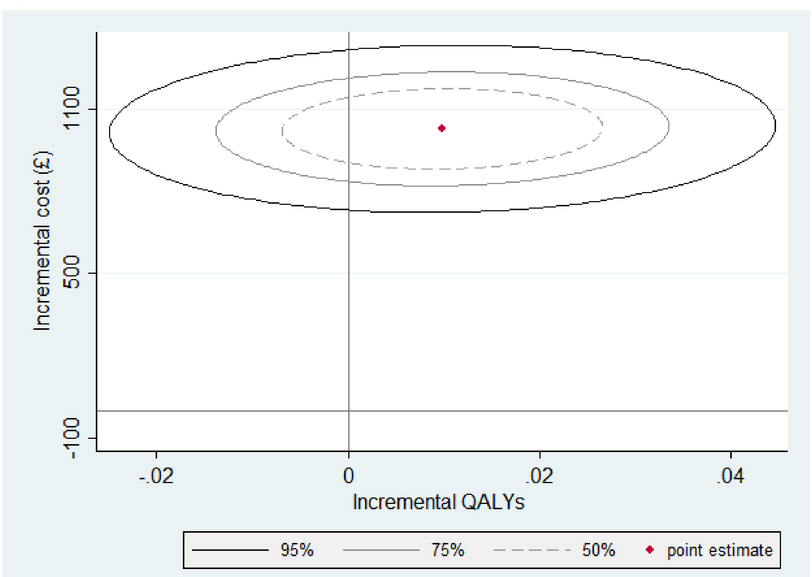
- In the trial-based analysis, the difference in total mean cost for HAL versus RBL was £1027 (95% confidence interval [CI], £782–£1272), p<0.001).
- The difference in mean QALYs was 0.01 (95% CI, -0.02–0.04). This led to an incremental cost-effectiveness ratio (ICER) of £104,427 per QALY gained.
- The cost-effectiveness acceptability curve (CEAC) generated from the parametric analysis applied on imputed trial data is presented in Figure 1.

Figure {1}: CEAC showing the probability of cost-effectiveness at different threshold values



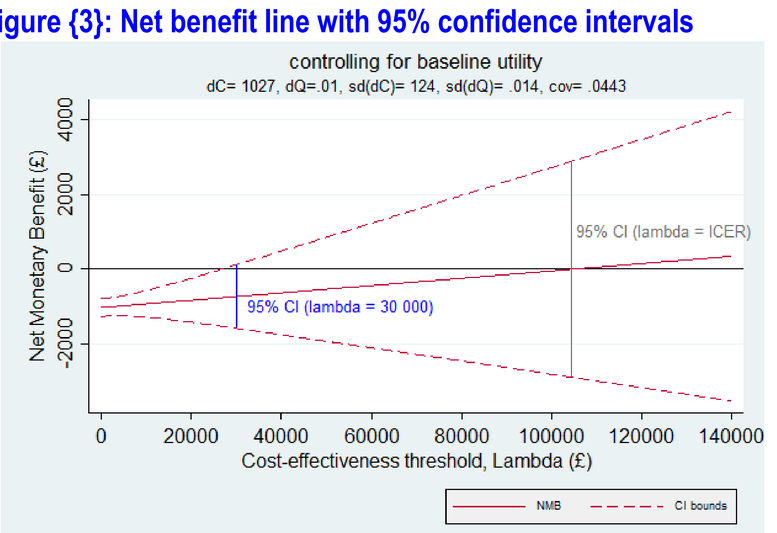
- Figure 2 shows the cost-effectiveness confidence ellipses which represent the ICER point estimate in the cost-effectiveness plane with 95%, 75% and 50% CIs around the base-case estimate.
- The cost per recurrence avoided was £4882 (95% CI, £3628–£6135).

Figure {2}: Cost-effectiveness confidence ellipses



- Figure 3 shows the incremental net monetary benefit line with 95% confidence intervals around the base case estimate.

Figure {3}: Net benefit line with 95% confidence intervals



- Results from sensitivity and subgroup analyses are reported in Table 1. The primary cost-effectiveness result was robust to all sensitivity analyses.

Table {1}: The RCT follow-up time periods

Analysis	Incremental cost (£) (95% CI); p-value	Incremental QALYs (95% CI); p-value	ICER	Probability of cost-effectiveness at £20,000 (£30,000) per QALY threshold
Complete cases	1073 (700–1447); <0.001	0.01 (-0.019 to 0.04); 0.50	90,688	0.00 (0.00)
Patient with recurrence after RBL (subgroup)	1091 (623–1558); <0.001	0.004 (-0.049 to 0.058); 0.87	246,959	0.05 (0.13)
Patients with grade III haemorrhoids (subgroup)	999 (760–1239);<0.001	0.01 (-0.09 to 0.037); 0.52	108,478	0.00 (0.07)
Applying QALY decrements for subsequent procedures	1030 (760–1300); <0.001	0.01 (-0.02 to 0.036); 0.56	125,076	0.00 (0.05)

Long-term analysis

In the long-term analysis, the probabilistic ICER was of £21,798 per QALY, generated from an incremental total mean cost of £1125 (95% CI, £1117–£1133) and incremental mean QALYs of 0.05 (95% CI, 0.048–0.055).

CONCLUSIONS

HAL procedure was not cost-effective compared with RBL for the treatment of symptomatic grade II–III haemorrhoids at a cost-effectiveness threshold of £20,000 per QALY.

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