Use of gadolinium-enhanced, ultrafast, three-dimensional, spoiled gradient-echo magnetic resonance angiography in the preoperative evaluation of living renal allograft donors

Buzzas G R, Shield C F, Pay N T, Neuman M J, Smith J L

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
Use of gadolinium-enhanced, ultrafast, three-dimensional, spoiled gradient-echo magnetic resonance angiography (MRA) in the preoperative evaluation of living renal allograft donors.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Living renal donors.

Setting
Outpatient department of university hospital. The economic study was conducted in Wichita, Kansas, USA.

Dates to which data relate
Dates were not clearly stated, but the study was first presented at the 16th Annual meeting of the American Society of Transplant Physicians in Chicago, in 1997.

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

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
In the 11 months before the inception of the MRA protocol, 15 living donors (nine men and six women) were evaluated using MRA (age 38.5 +/- 10.9), and 14 living donors (on whom 13 conventional angiograms were performed) were evaluated using conventional arteriography (age 38.0 +/- 8.9).

Study design
This was a non-randomised controlled study with historical controls carried out in a single centre. The period of follow-up was not reported.
Analysis of effectiveness
The main health outcome considered was the accuracy rate. Complication rate was also considered. Groups were comparable in age but not in gender.

Effectiveness results
The gadolinium-enhanced MRA technique was 100% accurate in 14 patients with surgical correlation and as reliable as conventional angiography in determining renal vascular anatomy in living kidney donors. In the single discrepant case MRA was technically compromised and the patient underwent conventional angiography. However, the patient was found to have a positive cross-match with the recipient and therefore did not undergo surgery. A second patient underwent conventional angiography in an attempt to confirm the presence of an accessory renal artery suggested by MRA. The angiogram failed to demonstrate any accessory renal vessel, but it was later encountered at surgery. In addition, MRA allowed for the evaluation of the donor kidney and the venous drainage. MRA-evaluated donors did not develop any of the potential angiographic complications that, although rare, are associated with conventional angiography, such as bleeding, hematoma, cholesterol emboli dissection, thromboemboli, pseudoaneurysm of the femoral artery, contrast reactions and contrast-related nephrotoxicity.

Clinical conclusions
MRA allowed for the accurate evaluation of the donor kidney and the venous drainage, and it was superior to conventional angiography.

Measure of benefits used in the economic analysis
The authors did not provide any measure of benefits.

Direct costs
Hospital charges were used as a proxy for costs. An average charge was determined for the two groups and compared. Chargeable items for MRA were the MRA study, contrast agent and supplies, and radiologist's interpretation fee. Chargeable items for conventional angiography were the angiographic study, contrast agent and supplies, aortic catheterisation, bowel preparation, outpatient admission and radiologist's interpretation fee. The charges related to the two patients who underwent conventional angiography after MRA were not included in the calculations. Cost dates were not given. Discounting was not relevant because of the short time frame of the study.

Statistical analysis of costs
A statistical analysis of costs was performed, but no details were provided by the authors.

Indirect Costs
Indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
Not applicable.
Cost results
The calculated average patient charge for MRA was found to be $2,186.15, versus $3,146.58 for conventional angiography.

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
The gadolinium-enhanced MRA technique was found to be 100% accurate and as reliable as conventional angiography in determining renal vascular anatomy in living kidney donors. Additionally, it shares none of the associated potential angiographic complications and allows a 31% cost saving over angiography.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparators is clear, as both preoperative evaluation techniques (MRA and conventional angiography) were widely used in the authors' setting. You, as a database user, should consider if this applies to your own setting.

Validity of estimate of measure of benefit
This was a small non-randomised trial and, therefore, the findings should be interpreted with a degree of caution. As the authors acknowledged, there had been previous reports which were in contrast with their own results. Although some of the advantages of MRA appear to be obvious further, more reliable, evidence is needed before conclusions can be reached about the cost-effectiveness of this recently introduced evaluative technique.

Validity of estimate of costs
The authors used charges as a proxy for costs in this study. The cost analysis was adequate and no important cost items have been omitted assuming, that the MR equipment is used for many other conditions and not only for preoperative assessment of living kidney donors. It would have been helpful had true costs been reported. The price date was not clearly reported. Cost results may not be generalisable to other settings or countries.

Other issues
The authors did not report any dates for the effectiveness, resource use or cost data. No details were provided about the statistical analysis of costs, nor was any sensitivity analysis performed. The authors made appropriate comparisons with other studies. The issue of the generalisability of the study results was not addressed.

Implications of the study
The authors concluded that MRA is the technique of choice in their setting. However, this conclusion should be interpreted in the light of the study limitations described above.

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