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Living FRIendly Summaries of the Body of Evidence using Epistemonikos (FRISBEE)

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Bipolar or monopolar transurethral resection for benign prostatic hyperplasia?

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Abstract

INTRODUCTION
Transurethral resection is currently considered as standard endoscopic treatment for lower urinary tract obstruction due to benign hyperplasia under 80 cc. Monopolar resection loops has been traditionally used but bipolar energy has recently displaced precedent technology. The purpose of this summary is to evaluate the efficacy and safety of both technologies.

METHODS
To answer this question we used Epistemonikos, the largest database of systematic reviews in health, which is maintained by screening multiple information sources, including MEDLINE, EMBASE, Cochrane, among others. We extracted data from the systematic reviews, reanalyzed data of primary studies, conducted a meta-analysis and generated a summary of findings table using the GRADE approach.

RESULTS AND CONCLUSIONS
We identified 13 systematic reviews including 32 primary studies, among them 31 randomized trials. We concluded although there may be no difference in terms of efficacy among both techniques, the use of bipolar energy reduces the incidence of transurethral resection syndrome and probably reduces the risk of bleeding that requires red blood cell transfusion.

Problem

Lower urinary tract obstruction caused by benign prostatic hyperplasia is a prevalent condition that causes bothersome symptoms and impaired quality of life. Occasionally, it can lead to complications that determine morbidity and mortality.

Transurethral resection has been traditionally considered standard endoscopic treatment for prostates of less than 80cc, being monopolar loops the most broadly used. However, its use is not free of complications such as transurethral resection syndrome, a clinical entity caused by the absorption of hypoosmolar fluids used in monopolar techniques. Bipolar diathermy emerged as an alternative that could be associated with a lower incidence of complications, provided by the use of isotonic solutions for the resection of the prostate. The purpose of this summary is to evaluate the clinical efficacy and safety of both techniques.

Methods

To answer the question, we used Epistemonikos, the largest database of systematic reviews in health, which is maintained by screening multiple information sources, including MEDLINE, EMBASE, Cochrane, among others, to identify systematic reviews and their included primary studies. We extracted data from the identified reviews and reanalyzed data from primary studies included in those reviews. With this information, we generated a structured summary denominated FRISBEE (Friendly Summary of Body of Evidence using Epistemonikos) using a pre-established format, which includes key messages, a summary of the body of evidence (presented as an evidence matrix in Epistemonikos), meta-analysis of the total of studies when it is possible, a summary of findings table following the GRADE approach and a table of other considerations for decision-making.

Key messages

- The use of bipolar energy reduces the incidence of transurethral resection syndrome.
- The use of bipolar energy probably reduces the risk of bleeding that requires red blood cell transfusion.
- The use of bipolar energy probably makes little or no difference in the IPSS at 12 months.
- The use of bipolar loops might make little or no difference in the QMax at 12 months, but the certainty of the evidence is low.

About the body of evidence for this question

What is the evidence. See evidence matrix in Epistemonikos later	We identified 13 systematic reviews [1],[2],[3],[4],[5],[6],[7],[8],[9],[10],[11],[12],[13] which include 32 primary studies reported in 49 references [14],[15],[16],[17],[18],[19],[20],[21],[22],[23],[24],[25],[26],[27],[28],[29],[30],[31],[32],[33],[34],[35],[36],[37],[38],[39],[40],[41],[42],[43],[44],[45],[46],[47],[48],[49],[50],[51],[52],[53],[54],[55],[56],[57],[58],[59],[60],[61],[62], among them 31 randomized trials, reported in 48 references [14],[15],[16],[17],[18],[19],[20],[21],[22],[23],[24],[25],[26],[27],[28],[29],[30],[31],[32],[33],[34],[35],[36],[37],[38],[39],[40],[41],[42],[43],[44],[45],[46],[47],[48],[49],[50],[51],[52],[53],[54],[55],[56],[58],[59],[60],[61],[62].This table and the review in general are based on the latter, since the observational study [57] did not improve the certainty of the evidence or provided additional relevant information.
What types of patients were included*	Patients with lower urinary tract obstruction due to benign prostatic hyperplasia who required endoscopic treatment were included. Patients with suspicion of prostate cancer or other causes of lower urinary tract obstruction were excluded. Average age ranged between 59 and 73 years in the different trials. Average prostate volume ranged between 39.5 and 82.5 cc.
What types of interventions were included*	Seventeen trials [15],[22],[26],[27],[31],[38],[39],[40],[42],[44],[53],[54],[56],[59],[60],[61],[62] used Gyrus Plasmakinetic bipolar resectoscope. Eight trials [14],[16],[20],[28],[32],[41],[50],[55] used Olympus TURis bipolar resectoscope. Three trials [43],[49],[58] used Vista CTR bipolar resectoscope. One trial [45], used AUTOCON II Storz resectoscope. The systematic reviews identified did not report which monopolar resectoscope was used in each trial.
What types of outcomes were measured	Multiple outcomes were measured in the trials. They were grouped in the systematic reviews as follows: magnitude of the obstruction (maximum urinary output (QMax) in ml/seg measured by uroflowmetry, postvoid residual volume, symptoms and quality of life using the International Prostate Symptoms Score (IPSS). Perioperative parameters (duration of surgery, hospital stay, urinary catheterization time, red blood cell transfusion rate and incidence of transurethral resection syndrome were also measured), and late postoperative complications such as erectile dysfunction, urethral stenosis, bladder neck contracture, urinary incontinence, reintervention rate, among others were assessed as well. Follow-up median among the trials was 12 months with a range of 1 to 60 months.

* The information about primary studies is extracted from the systematic reviews identified, unless otherwise specified.

Summary of Findings

The information about the effects of bipolar versus monopolar transurethral resection of the prostate is based on 31 randomized trials that include 4670 patients.
Twenty-five trials reported red blood cell transfusion rate (3585 patients) [14],[15],[16],[19],[20],[22],[26],[27],[28],[30],[31],[32],[39],[42],[44],[45],[49],[50],[53],[54],[58],[59],[60],[61],[62], 25 trials reported the incidence of transurethral resection syndrome (3436 patients), [14],[15],[16],[19],[20],[22],[26],[27],[30],[31],[32],[39],[42],[44],[45],[49],[50],[53],[54],[55],[58],[59],[60],[61],[62], 11 trials measured IPSS at 12 months (1452 patients) [16],[20],[27],[39],[45],[53],[56],[57],[59],[60],[62] and 13 trials measured QMax at 12 months (1649 patients) [16],[19],[20],[27],[31],[39],[45],[53],[56],[57],[59],[60],[62].

The summary of findings is:

- The use of bipolar energy reduces the incidence of transurethral resection syndrome. The certainty of the evidence is high.
- The use of bipolar energy probably reduces the incidence of bleeding that require red blood cell transfusion. The certainty of the evidence is moderate.
- The use of bipolar energy probably makes little or no difference in IPSS at 12 months compared with the use of monopolar resectoscope. The certainty of the evidence is moderate.
- The use of bipolar resectoscope might make little or no difference in the QMax at 12 months compared with the use of monopolar energy, but the certainty of the evidence is low.

Bipolar versus monopolar energy for transurethral resection of the prostate				
Patients	Men with benign prostatic enlargement and lower urinary tract symptoms who require surgery			
Intervention	Bipolar transurethral resection			
Comparison	Monopolar transurethral resection			
Outcome	Absolute effect*		Relative effect (95% CI)	Certainty of evidence (GRADE)
	WITH monopolar	WITH bipolar		
	Difference: patients per 1000			
Transurethral resection syndrome	15 per 1000	0 per 1000	RR 0.19 (0.08 to 0.46)	⨁⨁⨁⨁[1,2] High
	Difference: 15 patients less (Margin of error: 8 to 15 less)			
Red blood cell transfusion rate	40 per 1000	18 per 1000	RR 0.48 (0.33 to 0.72)	⨁⨁⨁◯[2] Moderate
	Difference: 22 patients less (Margin of error: 14 to 28 less)			
IPSS (12 months)	7.34 points	7.19 points	--	⨁⨁⨁◯[2] Moderate
	MD: 0.15 points less (Margin of error: 0.4 less to 0.1 more)			
QMax (12 months)	19.5 ml/sec	20.73 ml/sec	--	⨁⨁◯◯[2,3] Low
	MD: 1.23 ml/sec more. (Margin de error: 0.73 less to 1.73 more)			

Margin of error: 95% confidence interval (CI).
RR: Risk ratio.
MD: Mean difference.
GRADE: Evidence grades of the GRADE Working Group (see later).

*The risk **WITH monopolar** is based on the risk in the control group of the trials. The risk **WITH bipolar** (and its margin of error) is calculated from relative effect (and its margin of error).

** Calculated using the average value among the trials with greater weight.

[1] We upgraded one level of certainty of evidence due to large effect considering there were no events in bipolar group with a substantial number of patients
[2] We downgraded one level of certainty of evidence due to risk of bias.
[3] We downgraded one level of certainty of evidence due to inconsistency of the results among the trials, given some of them showed higher average QMax with monopolar transurethral resection.

Following the link to access the interactive version of this table (Interactive Summary of Findings – iSoF)

About the certainty of the evidence (GRADE)*
⨁⨁⨁⨁
High: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.
⨁⨁⨁◯
Moderate: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate
⨁⨁◯◯
Low: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.
⨁◯◯◯
Very low: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.
*This concept is also called 'quality of the evidence' or 'confidence in effect estimates'.
† Substantially different = a large enough difference that it might affect a decision.

Other considerations for decision-making

To whom this evidence does and does not apply

- This information applies to patients with lower urinary tract obstruction due to benign prostatic hyperplasia and does not apply for other causes of obstruction. However, the prevention of transurethral resection syndrome can be extrapolated to other endourological procedures that use the same technology due to the removal of hypo-osmolar solutions as the main cause of its occurrence.

About the outcomes included in this summary

- The critical outcomes for decision-making were selected according to the opinion of the authors of this summary. We selected International Prostate Symptom Score (IPSS) as a quantitative measure of lower urinary tract obstruction symptoms and maximum urinary output (QMax) measured by uroflowmetry as an objective measure of urinary flow.
- We selected red blood cell transfusion rate and transurethral resection syndrome as the main perioperative complications.

Balance between benefits and risks, and certainty of the evidence

- There is evidence at least of moderate certainty that shows the use of bipolar loops reduces the incidence of the main complications associated with the procedure and there might be no difference in terms of the efficacy between both techniques, although the evidence has limitations on this regard.
- Given the use of bipolar energy does not present higher risk of aditional complications, the benefits outweigh the risks.

Resource considerations

- Our conclusions are consistent with cost-effectiveness studies in the literature [63],[64]. They show the use of bipolar loops could lead to less costs due to the prevention of complications. This benefit outweigh the costs of bipolar energy implementation.

What would patients and their doctors think about this intervention

- Given the available evidence most clinicians should prefer bipolar technologies over monopolar loops. This decision might be influenced by the costs of implementation in the local context.
- There are multiple technologies for the endoscopic treatment of this condition that were not assesed in this review. It is necessary to take other technologies into account for decision-making.

Differences between this summary and other sources

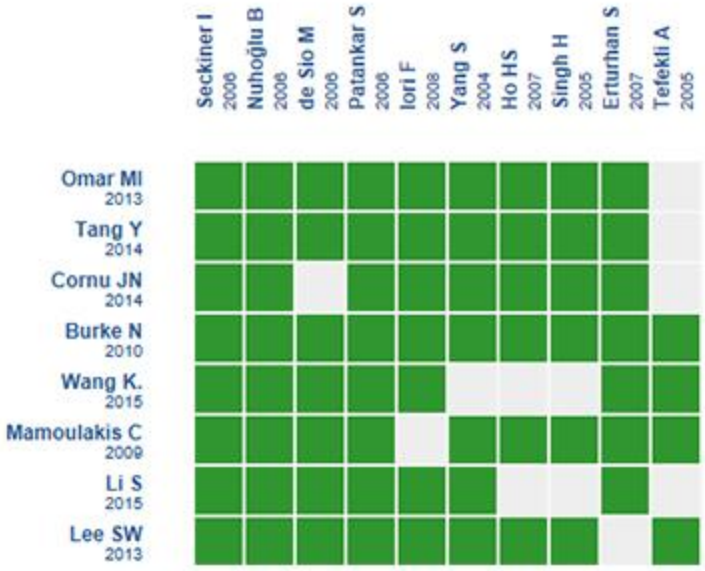
- Our conclusions are consistent with the identified systematic reviews, with the exception of one systematic review [9] which only contains three trials that answered our question.
- Our conclusions agree with one of the main guideline on this topic, the European Association of Urology guideline [65].

Could this evidence change in the future?

- The probability of new trials changing the conclusions of this summary is low, mainly due to the certainty of the existing evidence. However, there might be new data in terms of comparative safety between both techniques.
- No ongoing trials were identified in the International Clinical Trials Registry Platform.

How we conducted this summary

Using automated and collaborative means, we compiled all the relevant evidence for the question of interest and we present it as a matrix of evidence.



An evidence matrix is a table that compares systematic reviews that answer the same question.
Rows represent systematic reviews, and columns show primary studies.
The boxes in green correspond to studies included in the respective revisions.
The system automatically detects new systematic reviews including any of the primary studies in the matrix, which will be added if they actually answer the same question.

Follow the link to access the **interactive version:** Bipolar versus monopolar transurethral resection of the prostate for benign hyperplasia

Notes

The upper portion of the matrix of evidence will display a warning of "new evidence" if new systematic reviews are published after the publication of this summary. Even though the project considers the periodical update of these summaries, users are invited to comment in *Medwave* or to contact the authors through email if they find new evidence and the summary should be updated earlier.

After creating an account in Epistemonikos, users will be able to save the matrixes and to receive automated notifications any time new evidence potentially relevant for the question appears.

This article is part of the Epistemonikos Evidence Synthesis project. It is elaborated with a pre-established methodology, following rigorous methodological standards and internal peer review process. Each of these articles corresponds to a summary, denominated FRISBEE (Friendly Summary of Body of Evidence using Epistemonikos), whose main objective is to synthesize the body of evidence for a specific question, with a friendly format to clinical professionals. Its main resources are based on the evidence matrix of Epistemonikos and analysis of results using GRADE methodology. Further details of the methods for developing this FRISBEE are described here (http://dx.doi.org/10.5867/medwave.2014.06.5997)

Epistemonikos foundation is a non-for-profit organization aiming to bring information closer to health decision-makers with technology. Its main development is Epistemonikos database (www.epistemonikos.org).

Potential conflicts of interest
The authors do not have relevant interests to declare.

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