Research Article

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Open Prostatectomy vs. Laparoscopic Prostatectomy for Benign Prostatic Hyperplasia with Large Volume Prostate: A Meta-analysis

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ABSTRACT

Objective: *To compare laparoscopic prostatectomy with Open prostatectomy for benign prostatic hyperplasia with large volume (>80ml).*

Methods: *The literature was identified systematically using Medline, Embase. Meta-analysis was performed by Review Manager 5.0.*

Results: *3 CCTs were included. There was no difference between LP and OP in terms of IPSS, Qmax. LP was associated with significantly less blood loss, a shorter irrigation, catheterization and hospital stay time except longer operating time. LP and OP were similar in terms of urethral stricture, incontinence, transfusion requirement and rate of reintervention.*

Conclusion: *LP served a significant improvement in IPSS, Qmax as well as OP. Although more operating time and less resected tissue, LP has several advantages over OP. It was as safe as OP in terms of adverse events.*

Keyword

Open prostatectomy, Laparoscopic prostatectomy, Large volume prostate, Meta-analysis.

Introduction

Benign prostatic hyperplasia (BPH) is the most common urological diseases among aging men worldwild [1]. And surgery is an appropriate treatment for BPH with bladder calculi, acute urinary retention or other related complications [1]. Prostatic volume was an important factor which impacts the choice of surgical treatment. Open prostatectomy (OP) have been performed for large volume prostate, while transurethral resection of the prostate (TURP) for small to medium volume prostate [2]. Recently, laparoscopic prostatectomy (LP) is the most recent prostatectomy for large glands due to the entire prostatic adenomas enucleation [3]. Then several studies have compared the outcome and side-effect profiles of LP and OP for large prostate [4-6]. But their conclusions were conflicted.This Meta analysis was to review and synthesize the surgical outcome and safety of related trials between the two approaches for large prostate.

Methods

Literature search

We searched the MEDLINE, EMBASE and Cochrane library databases in any language from 1 January 2000 to 7 June 2012. A methodological filter was used to identify related studies with the Medical Subject Headings (Mesh) database keywords consisted of; benign prostatic hyperplasia (BPH), benign prostatic enlargement (BPE), benign prostatic obstruction (BPO); laparoscopic prostatectomy (LP); Prostatectomy.

In addition, we also add the literature by manual search: (1)

included abstracts presented at the meetings from American Urological Association (AUA), European Association of Urology (EAU). (2) The reference lists of eligible studies and relevant narrative reviews. (3) Other resource, such as literature searching on Google online.

Searching literature was performed by two independent urologists (Huang M P, Liu Q L) according to the screening inclusion and exclusion criteria. The third senior urologist (Chen H) helped review and resolve any disagreements.

Study selection

All related articles and general reviews of this topic were searched manually; commentaries, case senile and case reports were excluded. The inclusion criteria for initial screening were: Prostate volume >80ml.

Assessment of risk of bias in included studies

The assessing risk of bias table which recommended in the Cochrane handbook 5.1 was applied to assess the methodological quality of the included studies. Both randomized and non-randomized studies were assessed for risk of bias by this method. The two urologists (Huang J B, Chen S) assessed included studies for "risk of bias" according to the introduction of the Cochrane Handbook 5.1.

Data extraction

Create a standard form to abstract the available data for the addressing functional outcomes and complication rates form each procedure. The following variables were recorded: authors, journal and year of publication, geographical region, number of patients, age, International prostate symptom score (IPSS), maximum flow rate (Qmax), post void residual (PVR), duration of operation, catheterization time, hospital stay, urethral stricture, incontinence, blood transfusion, and re-operation. Two urologists extracted data (Li QQ, Liu J) independently. Disagreements were resolved by discussion, consensus, and arbitration by the third senior urologist (Chen H).

Data synthesis and analysis

For dichotomous outcomes, calculate relative risks (RR) and 95% confidence intervals (CI) for each study; for continuous outcomes, calculate weighted mean difference (WMD) and 95% CI. Heterogeneity was assessed by examining clinical characteristics of included studies as well as by formal statistical testing with Chi^2 and I^2 index. A fixed effects model was used to calculate pooled estimates of efficacy. However, if heterogeneity were experienced, we decided to perform random effects models. The funnel plots were used to assess the possibility of publication bias.

Software

Meta-analysis was conducted with Revman 5.1 software.

Result

After independent review, 3 CCTs were included. The total patient was 135(OP 68, LP 67) (Figure 1).

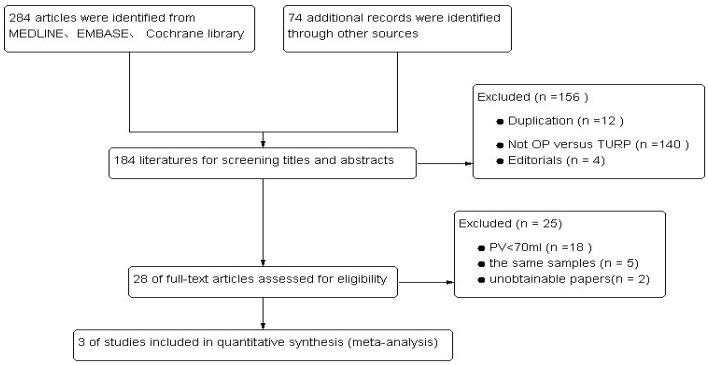

Figure 1: Study flow diagram.

There was no difference between LP and OP in terms of age, prostate volume (Table 1). Both Qmax and IPSS between LP and OP were similar at baseline and 1 months follow-up (Figure 2-5). LP was associated with significantly less blood loss, a shorter irrigation, catheterization and hospital stay time except longer operating time. LP and OP were similar in terms of urethral stricture, incontinence, transfusion requirement and rate of reintervention (Table 2).

		Number of patient	age(y)	PV (cm^3)
Baumert et al.	OP	30	69.7	106.2
	LP	30	67.4	121.8
	P value		0.21	0.07
Porpiglia et al.	OP	20	67.8	115.6
	LP	20	71	94.2
	P value		0.5	0.5
García-Segui et al.	OP	18	72.6	114.7
	LP	17	68.1	95
	P value		0.234	0.104

Table 1: Summary of (mean) baseline data comparing OP with LP.
OP = Open Prostatectomy, LP = Laparoscopic Prostatectomy.

		Pooled difference estimate	P value	I^2(%)	Difference in favour of
Perioperative data	Duration of operation (h)	-37.84 (-53.08,-22.60)	0.014	86	OP
	Resected tissue (ml)	9.26 (1.44, 17.09)	0.12	0	None
	Bladder irrigation (h)	1.30 (0.23,2.37)	0.02	92	LP
	Catheterization time (d)	1.32 (0.21,2.43)	0.02	67	LP
	Hospital stay (days)	1.62 (0.67,2.58)	0.0009	80	LP
Adverse events	Blood transfusion	0.98 (0.53, 1.81)	0.04	59	LP
	Urethral stricture	0.59 (0.08, 4.61)	0.61	0	None
	Incontinence	0.56 (0.17, 1.85)	0.61	0	None
	Repeat operation	0.44 (0.11, 1.70)	0.23	0	None

Table 2: Meta-analysis of perioperative data and adverse events comparing OP with LP.

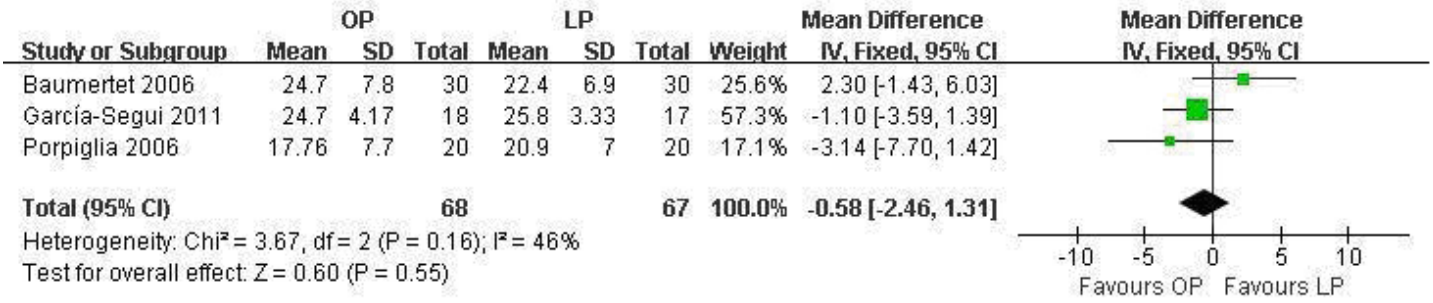

Figure 2: Forest plot comparison: the baseline IPSS between OPand LP.

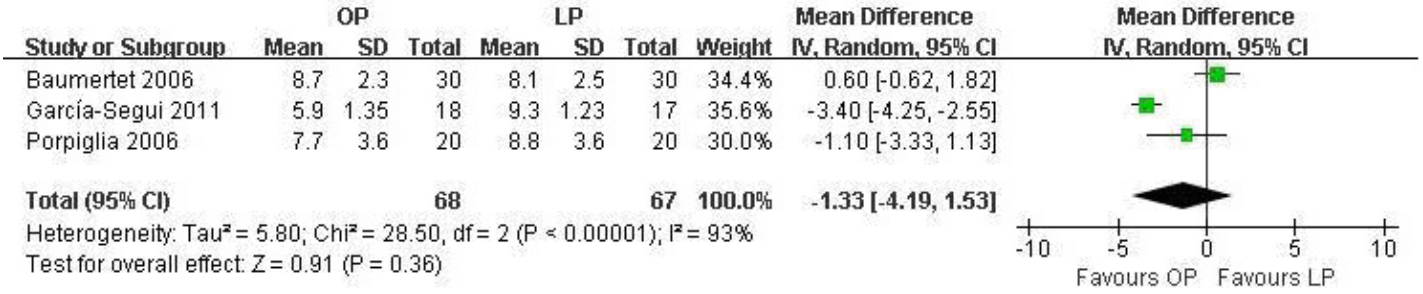

Figure 3: Forest plot comparison: the baseline Qmax between OPand LP.

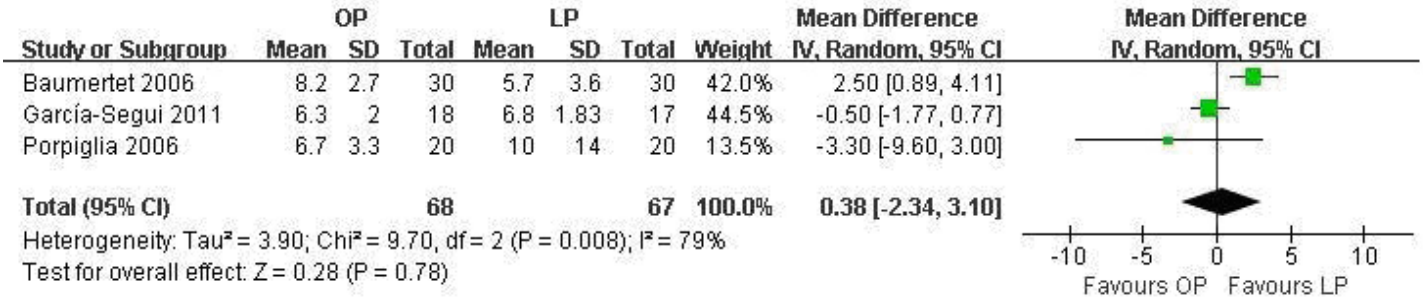

Figure 4: Forest plot comparison: the outcome data of IPSS between OPand LP.

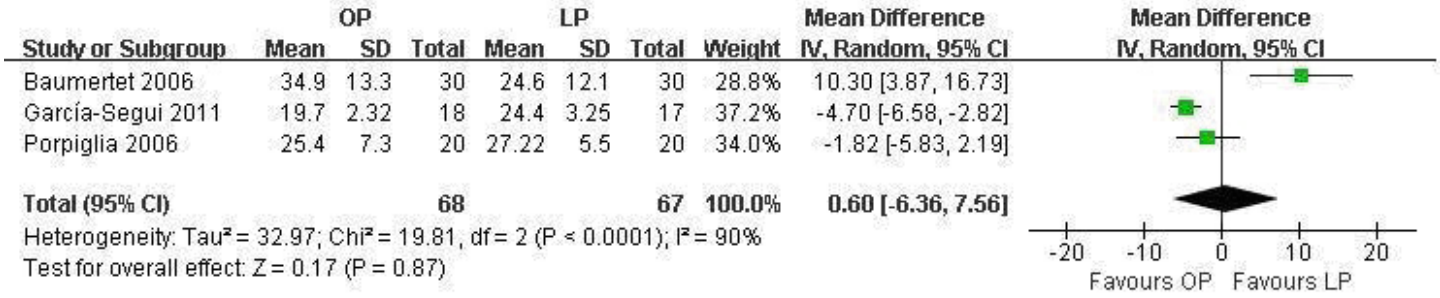

Figure 5: Forest plot comparison: the outcome data of Qmax between OPand LP.

Discussion

Open prostatectomy (OP) has been preformed in BPH for many years, especially in large volume prostate. It does not require any special equipment and serves with an entire enucleation. However, OP is still the most invasive therapy for BPH. Currently, laparoscopic prostatectomy (LP) is minimally invasive surgical therapy with little morbidity and equivalent success to OP. So, it raises a question whether LP can completely replace the role of OP for large volume prostate.

In the included studies, the baseline characteristics were comparable for no statistically significant difference, which suggested that the data was representative (Table 1).

Both LP and OP were effective in improving subjective IPSS, Qmax at 1 month after surgery (Figure 2-5).

It shows that LP could reach similarly effective to OP for large volume prostate which was respected to resected tissue (P=0.12)

between the two group. Besides, LP was more superior than OP for blood transfusion (2.99 % versus 13.23%, P=0.04), blood loss (400 ml versus 687.5ml) during the operation .Besides, due to less blood loss, the duration of catheterization and hospital stay in the LP group was significantly less than that in the OP group (P=0.02; P=0.0009). OP were superior to LP for operation time (P=0.014).

The reasons lie in: firstly, during the operation of open prostatectomy, the index finger helped quick and almost complete enucleation of the adenoma. Secondly, LP requires additional time to divide the adenoma into fragments which could be evacuated safely through resectoscope sheath.

This Meta-analysis has also shown that LP reduces the risk of complications. However, there are still some criticism which impact LP for the mainstream treatment for large prostate. Firstly, it needs the steep learning curve. LP requires longer training period than traditional surgery. Secondly, the cost of LP equipment is another issue which influences the widespread application.

Certain limitations of the study must be recognized. Firstly, although we performed a systematic literature search, still some literatures were omitted, such as unpublished literature, uncompleted research reports, and work in progress. Secondly, the procedures were performed by different urologists and holmium laser equipment in each hospital which potentially affected the studies outcomes. Thirdly, lack of long term follow-up.

Acknowledgments

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