

Background

- Staplers have been widely used in wound suturing, organ removal, organ transection and anastomosis in cardiothoracic surgery, gastrointestinal surgery, hepatobiliary, splenic and pancreatic surgery, general surgery, urology and other surgical fields [1,2].
- Staplers can reduce bleeding, reduce the risk of postoperative air leakage, and tissue damage [3]. Staplers can be classified as powered stapler and manual stapler according to the power mode.
- Few studies comparing the clinical safety and efficacy of powered stapler and manual stapler, and the research conclusions are different [4-6].



Objective

To evaluate effectiveness and safety of the powered staplers versus manual staplers performing in surgery.

Methods

- Keywords such as "stapler", "powered stapler", "manual stapler", "effectiveness" and "safety" were systematic searched in CNKI, Wan Fang, Medline(PubMed), EMBASE and Web of Science database. The search period was from January 1, 2012 to November 27, 2022.
- Population:** Adult patients of cardiothoracic, gastrointestinal, liver, general surgery; **Intervention (Comparator):** Different types of powered or manual stapler; **Study design:** RCT, non-RCT, observational study etc.

Methods

- Primary outcomes:** operation time, length of hospital stay, blood loss, anastomotic leakage/air leakage incidence, bleeding/blood transfusion rate, 30-day readmission rate, physician satisfaction and instrument performance index.
- Statistical methods:** Meta-analysis was conducted to calculate odds ratio (OR) and mean difference (MD) with corresponding 95% confidence intervals. Further subgroup analysis was conducted to compare powered with manual in linear/vascular staplers and powered with manual in circular staplers.

Results

- A total of 19 studies were included in final analysis, with 6 single-arm studies on powered staplers and 13 studies comparing the use of powered and manual staplers in surgery. Thirteen of the included studies were retrospective studies and 6 were prospective studies (Fig. 1).

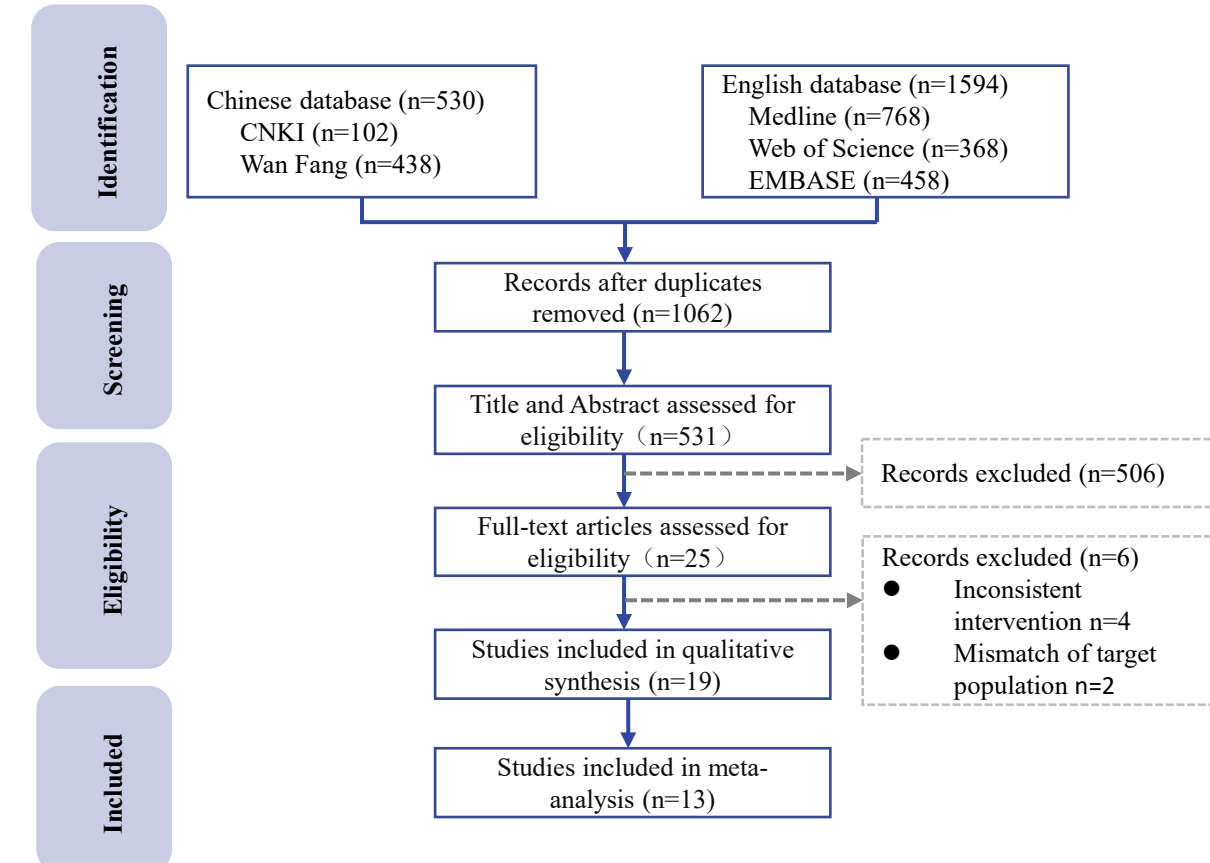


Fig. 1 PRISMA flow chart

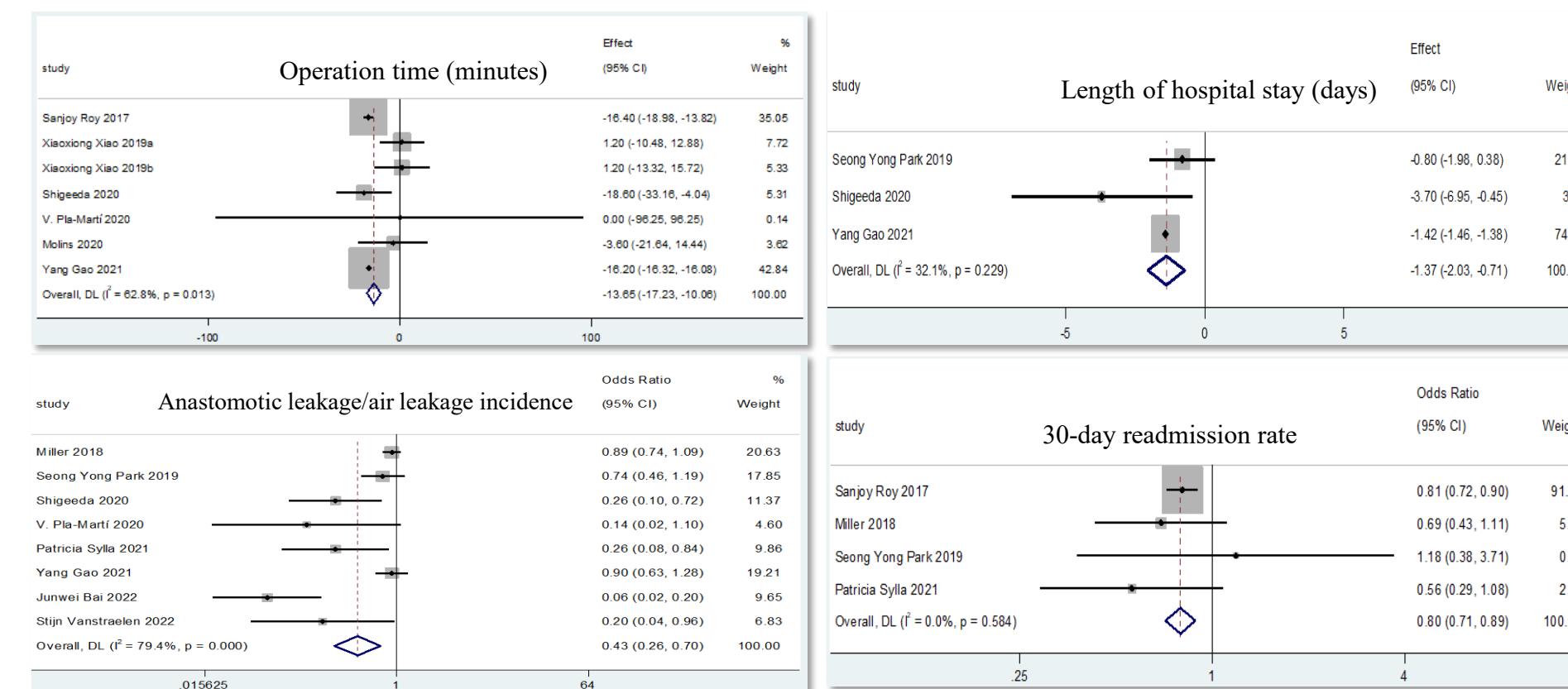


Fig. 2 Outcomes with statistically significant difference

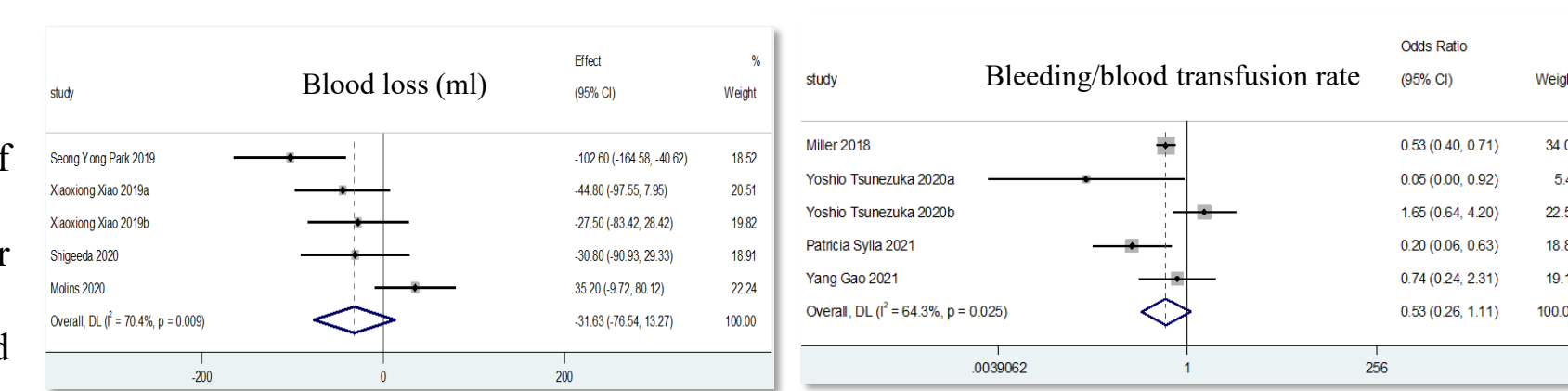


Fig. 3 Outcomes without statistically significant difference

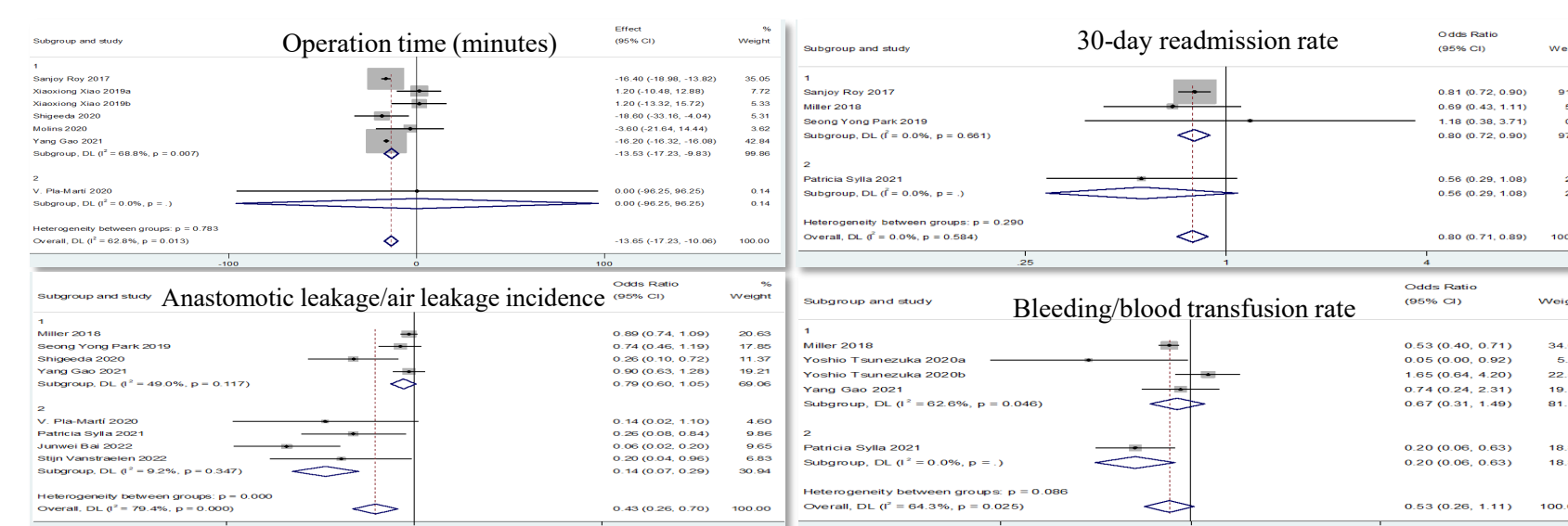


Fig. 4 Subgroup analysis results for different outcomes (Subgroup 1 is linear/vascular stapler; Subgroup 2 is circular stapler)

Results

- Qualitative synthesis
 - Powered stapler is more convenient to use, has better usability [7-9], and with short learning curve[9].
 - Powered stapler was more user-friendly, better instrument performance[8].

Conclusion

Our study showed superiority of powered staplers compared to manual staplers in operation time, length of hospital stay, anastomotic leakage/air leakage incidence and 30-day readmission rate. However, further high-quality studies are needed to obtain definitive conclusions.

References

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Contact

- Bao Liu, Professor, E-mail: liub@fudan.edu.cn.
- Qian Xu, PhD student, E-mail: qianxu134@163.com.