



## Review

# The efficiency and safety of fibrin sealant for reducing blood loss in primary total hip arthroplasty: A systematic review and meta-analysis



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## HIGHLIGHTS

- The meta-analysis was to evaluate the efficiency and safety of administration of fibrin sealant (FS) on patients undergoing primary THA.
- Only high quality studies was included.
- Administration of fibrin sealant in THA could reduce total blood loss and transfusion requirements.

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## ABSTRACT

**Objective:** Total hip arthroplasty (THA) is associated with substantial blood loss. The objective of present systematic review and meta-analysis is to provide evidence from randomized controlled trials (RCTs) on the efficiency and safety of administration of fibrin sealant (FS) for reducing blood loss in patients undergoing primary THA.

**Methods:** Potential relevant studies were identified from electronic databases including Medline, PubMed, Embase, ScienceDirect, web of science and Cochrane Library. Gray academic studies were also identified from the reference list of included studies. There was no language restriction. Pooling of data was carried out by using RevMan 5.1.

**Results:** Six randomized controlled trials (RCTs) met the inclusion criteria. Current meta-analysis indicated that there were significant differences in terms of total blood loss (MD = -153.77, 95% CI: -287.21 to -20.34, P = 0.02), postoperative hemoglobin level (MD = -0.25, 95% CI: -0.46 to -0.05, P = 0.02) and transfusion rate (RD = -0.12, 95% CI: -0.22 to -0.03, P = 0.01) between groups. No significant differences were found regarding the incidence of deep venous thrombosis (DVT) (RD = 0.00, 95% CI: -0.01 to 0.01, P = 0.51) or other side effects.

**Conclusion:** Administration of fibrin sealant in total hip arthroplasty may reduce total blood loss, postoperative hemoglobin decline and transfusion requirements. Moreover, no adverse effect was related to FS. Due to the limited quality of the evidence currently available, higher quality RCTs are required.

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## 1. Introduction

Total hip arthroplasty (THA) is considered as major orthopedic surgery to treat end-age osteonecrosis of femoral head, degenerative arthritis and traumatic conditions such as displaced femoral neck fractures. However, substantial blood loss may occur perioperatively in THA patients, which cause unsatisfactory outcome

and systemic complications especially in elderly individuals [1,2]. Many techniques have been employed for blood management including tourniquet, auto-transfusion, administration of hemostatic agents and autologous pre-donation [3]. Allogenic blood transfusion entails risks such as transmission of viral infection, immunologically mediated disease and cardiovascular dysfunction causing financial burden and potential health threat for patients [4]. FS is a complex compound with fibrinogen and thrombin which has been in used in orthopedic surgery for reducing intra-operative blood loss and decrease the amount of blood transfusion for a few decades [5,6]. Recently, FS is becoming a popular agent for reducing blood loss in joint replacement surgery. In THA, topical application of FS has been reported in previous literature, but results of

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different studies have been conflicting.

Therefore, this paper reports a meta-analysis to provide evidence from randomized controlled trials (RCTs) on the efficiency and safety of topical use of FS on patients undergoing primary THA. Results of this meta-analysis suggest that blood loss and transfusion requirements can be reduced by topical use of FS without increasing occurrence of infection, deep vein thrombosis (DVT) or pulmonary embolism (PE).

## 2. Methods

### 2.1. Search strategy

Potential relevant literature were identified from electronic databases including Medline (1966–2016.1), PubMed (1966–2016.4), Embase (1980–2016.4), ScienceDirect (1985–2016.4), web of science (1980–2016.4) and Cochrane Library. Gray academic studies were also identified from the reference list of included studies. There was no language restriction. Following key words “Total hip replacement OR arthroplasty”, “Fibrin sealant”, “blood loss” and “blood transfusion” were used in combination with Boolean operators AND or OR. The search process was performed as presented in Fig. 1.

### 2.2. Inclusion and exclusion criteria

Studies were considered for selection if following criteria were met: (1) randomized controlled trials (RCTs) of patients who underwent primary unilateral hip joint replacements, regardless of

the type or size of prosthesis used; (2) the only intervention considered was the use of fibrin sealant versus no use of fibrin sealant or placebo; and (3) Reported surgical outcome including hemoglobin decline or postoperative hemoglobin level, total blood loss, transfusion requirements, length of stay, operation time and FS-related adverse effects such as wound infection, deep vein thrombosis (DVT) and pulmonary embolism (PE) and we excluded studies of bilateral total hip arthroplasty, cadaver studies, duplicate publications and artificial models. Non-RCTs, letters, comments, editorials, practice guidelines and other studies with insufficient data were also excluded from this meta-analysis.

### 2.3. Data extraction

Two reviewers independently reviewed the title and abstract of the potential literature. Further, full text of the studies meeting the inclusion criteria was reviewed and final decision was made regarding inclusion or exclusion. Disagreement was resolved by consulting a senior reviewer. Two of the authors independently extracted the data from the included studies. Corresponding author or first author was consulted for details of incomplete data. Following data was extracted: (1) Demographic characteristics of participants and included studies: First author names, published year, sample size, mean age, gender and duration of follow up. (2) Surgical information including anesthesia methods, surgical approach, prophylactic antithrombotic therapy and transfusion trigger. (3) Surgical outcome for meta-analysis including total blood loss, maximum postoperative hemoglobin decline, drainage volume, transfusion requirement, operation time, length of stay and

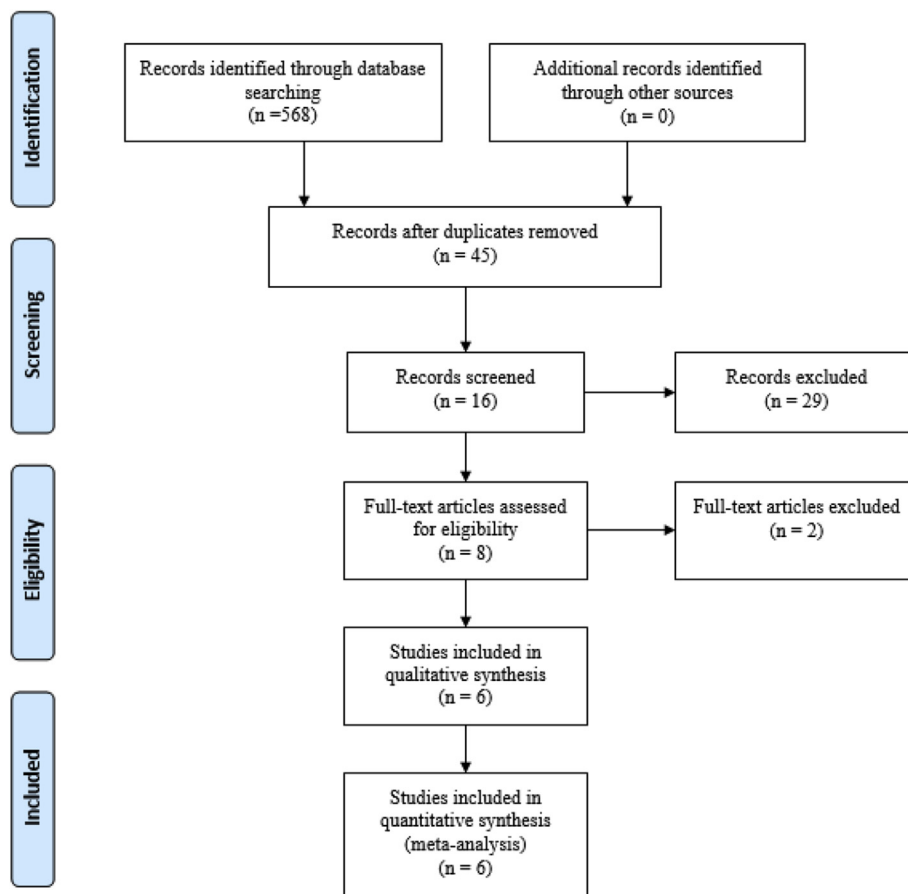


Fig. 1. Search results.

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