

全膝關節置換術術後病人使用Tranexamic acid是否可有效改善失血量

What is the ideal route of administration of tranexamic acid in total knee arthroplasty?
A meta-analysis based on randomized controlled trials

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(圖片取自: Implantation of a NexGen LPS TKA after previous closed-wedge osteotomy... | Download Scientific Diagram (researchgate.net))

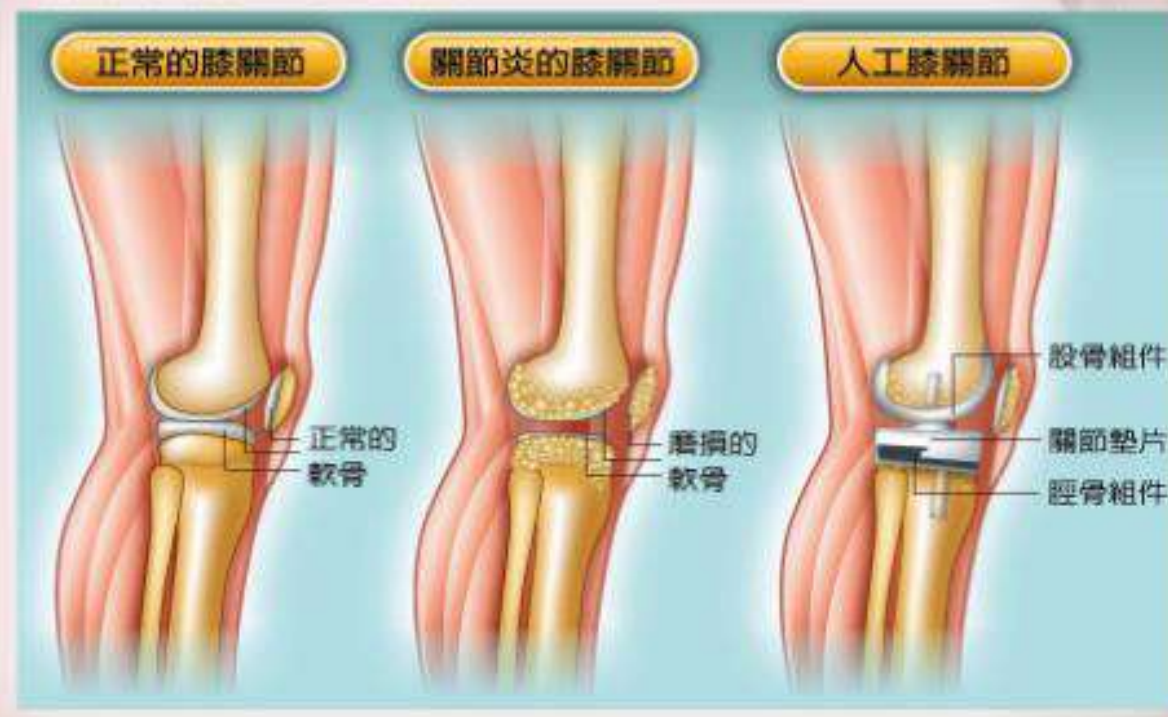
退化性關節炎-流行病學

- 退化性關節炎(Osteoarthritis)，是最常見骨科疾病之一，就美國關節炎基金會(Arthritis Foundation)的估計，2050年前至少影響全球1.3億人。
- 據衛生福利部統計，台灣國人膝關節退化的盛行率約15%，350萬人飽受關節疼痛之苦，58歲以上長者，每5人中就有1人有關節退化問題；70歲以上老人更有70%以上罹患關節退化性關節炎(衛福部，2021)。

退化性關節炎-病因

- 主要的病理是關節軟骨磨損，造成關節疼痛。

膝關節構造示意圖



重量的角色；
都須承受高

(何為斌、張惟淳，2019)

退化性關節炎-治療

- 保守治療
- 手術治療



保守治療

- 改變生活型態，減少關節負擔

維持標準體重、適當的運動、避免長時間相同坐姿及搬重物。

- 口服藥物治療

一般以非類固醇的消炎止痛藥為主。

- 注射藥物治療

目前門診會使用PRP(Platelet-Rich Plasma,高濃度血小板血漿)。

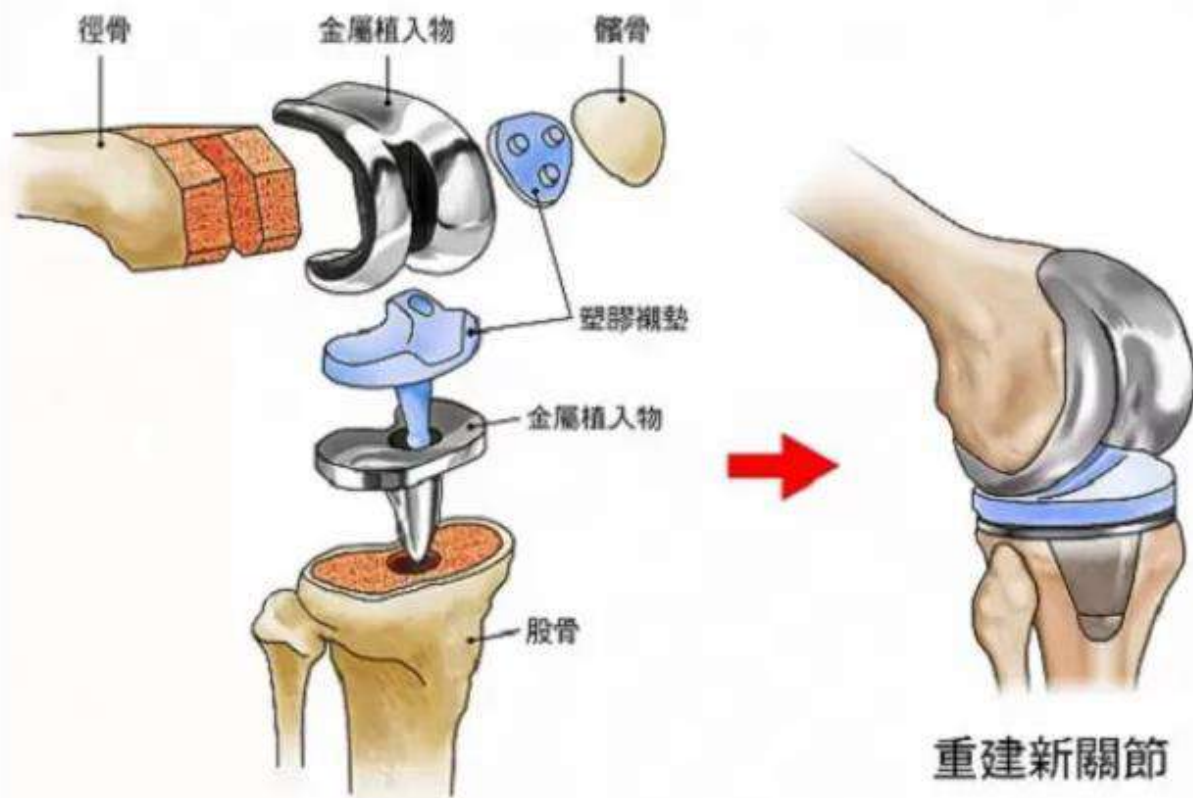
(何為斌、張惟淳，2019)



手術治療

- 常用手術方式為**Total Knee Arthroplasty**。
- 手術時大多採用脊椎(半身)麻醉。且會在大腿上綁上止血帶，以減少出血。
- 人工膝關節假體(植入物)，目前有許多不同廠牌，其設計原理大致相同。
- 手術中可能會出現出血、肺擴張不全、心肌梗塞、腦中風、靜脈血栓等風險。

- 手術中雖有使用止血帶減少出血量，但因放置植入物時須將部分骨切除，故會導致出血量增加，所以才會需要放置引流管。



護理照護

- 手術後住院約需四天至一星期，術後立即使用連續式膝關節被動運動器，以協助改善膝關節的運動範圍。
- 第二天起即鼓勵病人下床，以輔具協助行走練習股四頭肌肌肉力量。

(何為斌、張惟淳，2019)



本院臨床現況

目前本院每年約75人行膝關節置換手術。

術前監測Hemoglobin平均維持在11~14(gm/dl)，術後再次監測平均為8~11(gm/dl)。

引流管放置平均約3天，引流管量約250ml。

臨床未常規使用止血藥物。



PICO

研究族群／問題 (Population/ Problem) :

- Total Knee Arthroplasty(TKA) Patients

介入措施 (Intervention) :

- Oral , Intravenous or Topical tranexamic acid(TXA)

比較 (Comparison) :

- Do not use tranexamic acid

結果 (Outcomes) :

- Reduce total blood loss



本次探討文獻

What is the ideal route of administration of tranexamic acid in total knee arthroplasty? A meta-analysis based on randomized controlled trials

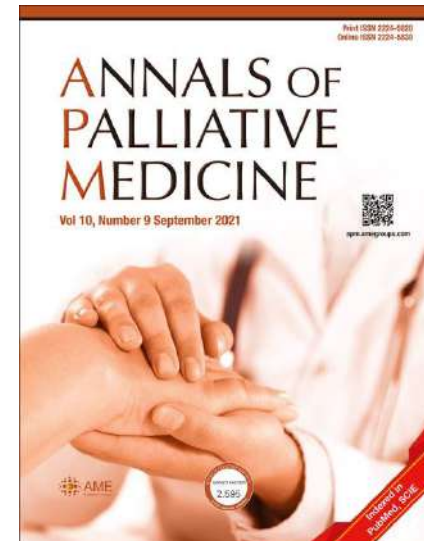
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Affiliations + expand

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Free article

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IF 2.595



系統性文獻回顧探討的問題(PICO)

研究族群／問題 (Population/ Problem)：

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結果 (Outcomes)：

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Appraisal sheets(FAITH)

- F-Find(研究是否找到所有的相關證據?)
- A-Appraisal(文獻是否經過嚴格評讀?)
- I-Included(是否只納入具良好效度的文章?)
- T-Total up(作者是否以表格和圖表「總結」試驗結果?)
- H-Heterogeneity(試驗的結果是否相近-異質性?)

FAITH-研究是否找到所有的相關證據

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Literature search strategy

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This meta-analysis does not require the approval of the ethics committee. Literature search was conducted by using the electronic databases PubMed, Medline, Web of Science and Embase (last search was updated on March 31, 2020). The following keywords were used to search the data base: (“TKA” OR “Total knee arthroplasty”) AND (“tranexamic acid” OR “TXA”) AND (“randomized controlled trials” OR “RCT”). The included literatures must be written in English.

搜尋詞彙
(搜尋策略)

只限英文

證據使用。

良好的文獻搜尋至少應包括二個主要的資料庫(如:Medline,Cochrane 考科藍實證醫學資料庫,EMBASE等)。

並且加上文獻引用檢索(參考文獻中相關研究、Web of Science,Scopus 或 Google Scholar)、試驗登錄資料等。

文獻搜尋應不只限於英文,並且應同時使用MeSH字串及一般檢索詞彙(text words)。



PRISMA

1882

Lu et al. The ideal route of administration of TXA in TKA

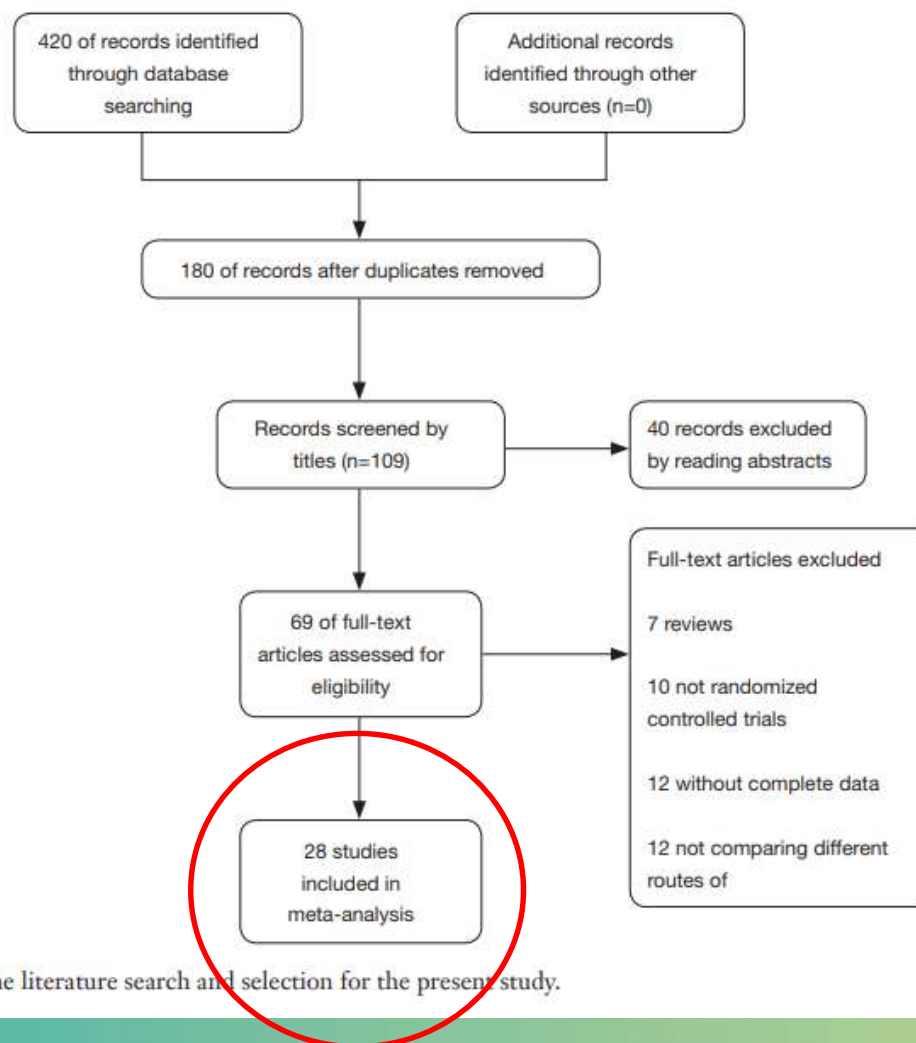


Figure 1 Flowchart of the literature search and selection for the present study.



FAITH-文獻是否經過嚴格評讀

P.1881

Study quality assessment

Study quality assessment was conducted by using the Cochrane Collaboration's tool to assess the risk of bias.

This tool was conducted by the following 6 items: sequence of generation, allocation concealment, blinding of participants and personnel and outcome assessors, incomplete outcome data, selective outcome reporting, and other sources of bias. The results were classified into three grades: "low risk, moderate risk, and high risk".

本篇使用考科藍誤差風險評估工具評估六個項目:分派順序的隱密、維持受試者與研究者盲性、維持預後評、不完整的研究結果報告和其他誤差。提出“低風險”、“高風險”的結果。

評讀結果：

☒ 是

☐ 否

☐ 不清楚

應根據不同臨床問題的文章類型,選擇適合的評讀工具,並說明每篇研究的品質(如針對治療型的臨床問題,選用隨機分配、盲法、及完整追蹤的研究類型)。

在文章的方法章節,可以找到所使用的文獻品質評讀標準的描述,而結果章節則會列出每篇研究品質的評讀結果。



Table 1 Study characteristics and patient demographic details

Author	Year	Region	Sample size	Mean age (year)	Male (%)	Comparison types	Intravenous	Topical	Oral	Surgery	Tourniquet	Risk of bias
Tsukada (10)	2019	Japan	77	76	21	Intravenous vs. combined	1 g+1 g	1 g	N/A	Bilateral TKA	No	Low
King (14)	2019	Australia	53	65	49	Oral vs. combined	1 g	3 g	3 g	Unilateral TKA	No	Low
Wang (15)	2019	China	118	64	22	Intravenous vs. oral	20 mg/kg	1 g	N/A	Unilateral TKA	No	Low
Zhang (16)	2019	China	150	62	25	Intravenous vs. topical vs. combined	20 mg/kg	3 g	N/A	Unilateral TKA	No	Low
Meshram (17)	2020	Korea	309	69	6	topical vs. combined	10 mg/kg+10 mg/kg	2 g	N/A	Bilateral TKA	Yes	Low
Wang (18)	2018	China	180	64	27	Intravenous vs. topical vs. oral	20 mg/kg	2 g	2 g	Unilateral TKA	No	Low
Cao (19)	2018	China	118	65	19	Intravenous vs. oral	20 mg/kg+1 g	N/A	2 g	Unilateral TKA	No	Low
Abdel (20)	2018	USA	640	66	41	Intravenous vs. topical	1 g+1 g	3 g	N/A	Unilateral TKA	Yes	Low
Kim (21)	2018	Korean	308	70	5	Intravenous vs. combined	1 g	2 g	N/A	Bilateral TKA	Yes	Low
Wei (22)	2018	China	64	66	47	Intravenous vs. topical	10 mg/kg	1 g	N/A	Unilateral TKA	Yes	Low
Prakash (11)	2018	Korea	150	70	14	Intravenous vs. topical vs. combined	10 mg/kg+10 mg/kg	1.5 g	N/A	Unilateral TKA	Yes	Low
Wang (23)	2018	China	147	64	22	Topical vs. oral	N/A	3 g	4 g	Unilateral TKA	No	Low
Subramanyam (24)	2018	India	182	63	67	Intravenous vs. topical	10 mg/kg	1.5 g	N/A	Unilateral TKA	Yes	Low
Yen (25)	2017	Taiwan	63	70	27	Intravenous vs. topical	1 g	3 g	N/A	Unilateral TKA	Yes	Low
George (26)	2018	India	113	64	34	Intravenous vs. topical	10 mg/kg+10 mg/kg	1.5 g	N/A	Unilateral TKA	Yes	Low

Table 1 (continued)

Table 1 (continued)

Author	Year	Region	Sample size	Mean age (year)	Male (%)	Comparison types	Intravenous	Topical	Oral	Surgery	Tourniquet	Risk of bias
Lacko (27)	2018	Slovakia	60	68	42	Intravenous vs. topical	10 mg/kg+10 mg/kg	3 g	N/A	Unilateral TKA	Yes	Low
Wang (28)	2017	China	100	68	28	Intravenous vs. topical	1 g	1 g	N/A	Unilateral TKA	Yes	Low
Stowers (29)	2017	New Zealand	111	70	50	Intravenous vs. topical	1.5 g	1.5 g	N/A	Unilateral TKA	Yes	Low
Lee (30)	2017	Korea	376	73	8	Intravenous vs. topical vs. combined	10 mg/kg+10 mg/kg	2 g	N/A	Unilateral TKA	Yes	Low
Cankaya (31)	2017	Turkey	100	66	16	Topical vs. oral	N/A	1.5 g	25 mg/kg	Unilateral TKA	Yes	Low
Tzatzairis (32)	2016	Greece	80	70	20	Intravenous vs. topical	1g	1 g	N/A	Unilateral TKA	No	Low
May (33)	2016	USA	131	64	22	Intravenous vs. topical	1 g+1 g	2 g	N/A	Unilateral TKA	Yes	Low
Song (34)	2017	Korea	150	70	14	Intravenous vs. topical vs. combined	10 mg/kg+10 mg/kg	1.5 g	N/A	Unilateral TKA	Yes	Low
Nielsen (35)	2016	USA	60	65	47	Intravenous vs. combined	1 g	1 g	N/A	Unilateral TKA	No	Low
Fillingham (36)	2016	USA	71	63	34	Intravenous vs. oral	1 g	N/A	1.95 g	Unilateral TKA	Yes	Low
Aggarwal (37)	2016	India	70	58	64	Intravenous vs. topical	15 mg/kg+15 mg/kg	15 mg/kg	N/A	Bilateral TKA	Yes	Low
Jain (38)	2016	India	119	69	37	Intravenous vs. combined	1 g mg/kg+10 mg/kg	2 g	N/A	Unilateral TKA	No	Low
Chen (39)	2016	Singapore	100	65	25	Intravenous vs. topical	1.5 g	1.5 g	N/A	Unilateral TKA	Yes	Low

N/A, not available.



FAITH-是否只納入良好效度的文章? (1)

P.1881

Data extraction

All data were extracted by two independent researchers according to the criteria. A data extraction table was provided including the year of publication, first author name, sample sizes, mean ages, male (%), comparison types, Intravenous regimen, topical regimen, oral regimen, surgery, tourniquet use, calculation method of blood loss, time of postoperative evaluation of Hb, evaluation method of VTE and the indications of blood transfusion.

僅進行文獻判讀
是不足夠,系統性
文獻回顧只納入
至少要有一項研
究結果是極小偏
誤的試驗。

所有數據由兩位獨立的研究人員蒐集而來，但未提及若意見不一致有無第三位研究人員去判讀。

評讀結果：

☐ 是

☐ 否

☐ 不清楚



FAITH-是否只納入良好效度的文章? (2)

P.1881

Inclusion and exclusion criteria

Inclusion criteria: (I) RCTs; (II) patients: underwent TKA (III) groups including topical TXA, intravenous TXA, oral TXA or combination; (IV) complete outcome data. Reviews, case reports, biochemical studies, letters, and conference abstracts were excluded.

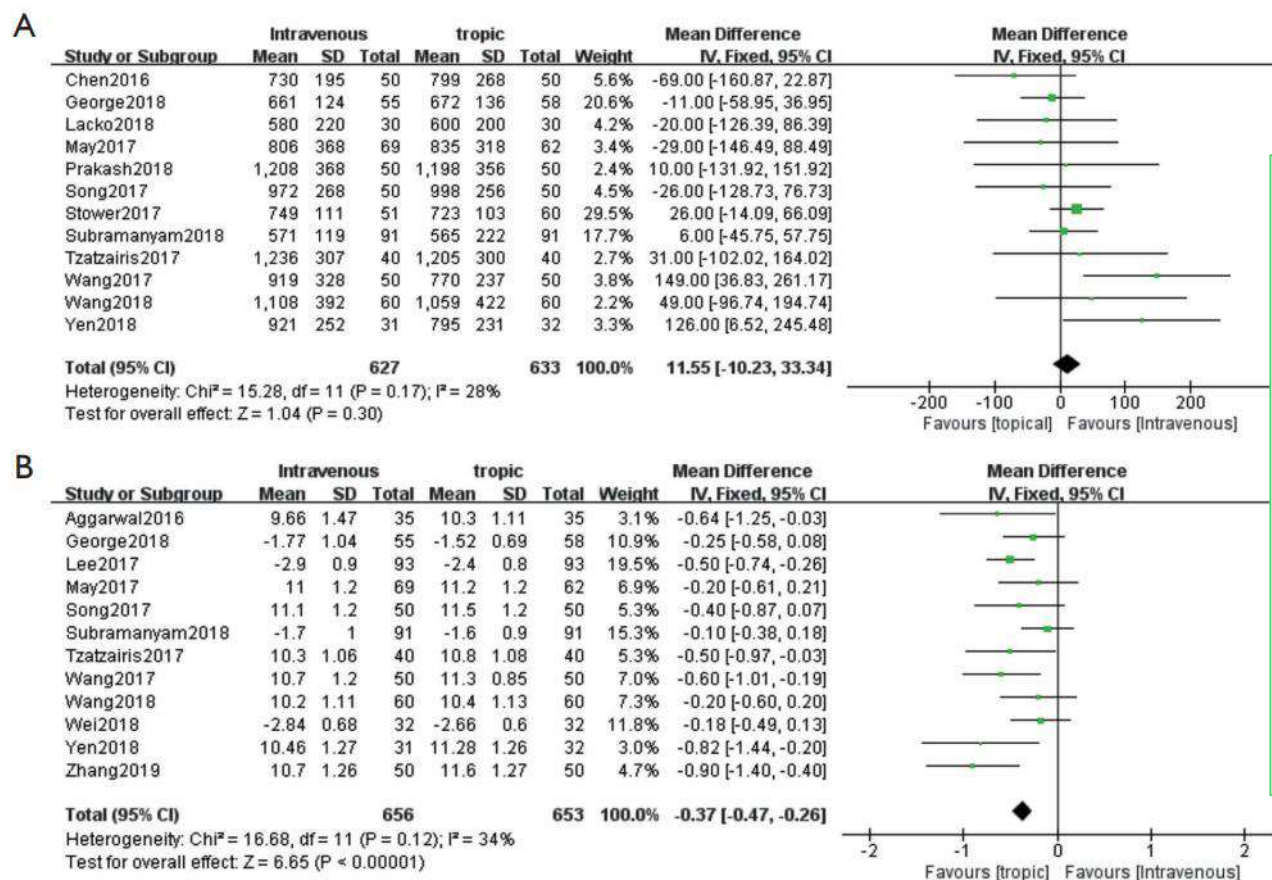
納入標準:(一)隨機對照試驗 ; (二)患者:開過TKA ; (三)包括局部使用TXA、靜脈注射TXA、口服TXA或合併使用 ; (四)完整的結果數據。
評論、病例報告、生化研究、信件和會議摘要皆被排除在外。



FAITH-是否以表格和圖表總結試驗結果 (1)

Annals of Palliative Medicine, Vol 10, No 2 February 2021

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應該用至少 1 個摘要表格呈現所納入的試驗結果。若結果相近,可針對結果進行統合分析(meta-analysis),並以「森林圖」(forest plot)呈現研究結果,最好再加上異質性分析。

Figure 2 Forest plot between intravenous and topical tranexamic acid (A) blood loss. (B) Hemoglobin level. (C) venous thrombotic events rate. (D) transfusion rate.

FAITH-是否以表格和圖表總結試驗結果 (2)

1888

Lu et al. The ideal route of administration of TXA in TKA

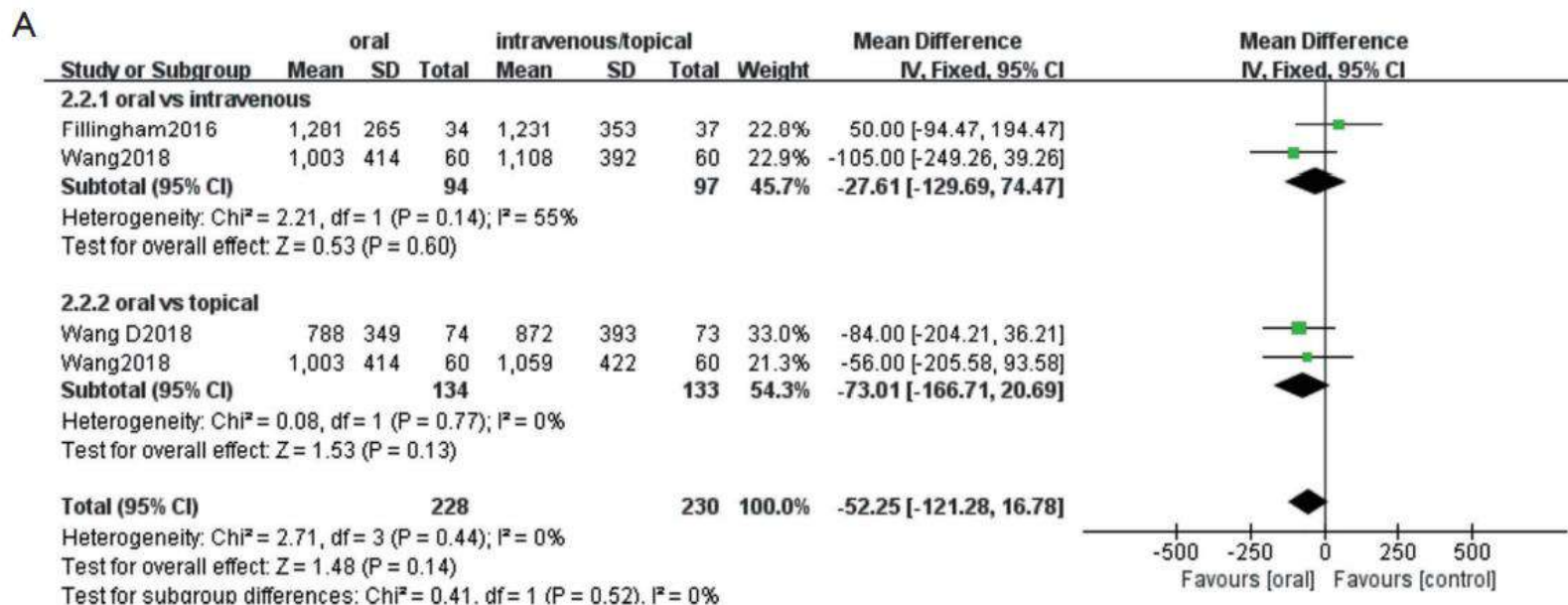


Figure 3 Forest plot between oral and intravenous or topical tranexamic acid (A) blood loss. (B) Hemoglobin level. (C) transfusion rate.

FAITH-是否以表格和圖表總結試驗結果 (3)

1890

Lu et al. The ideal route of administration of TXA in TKA

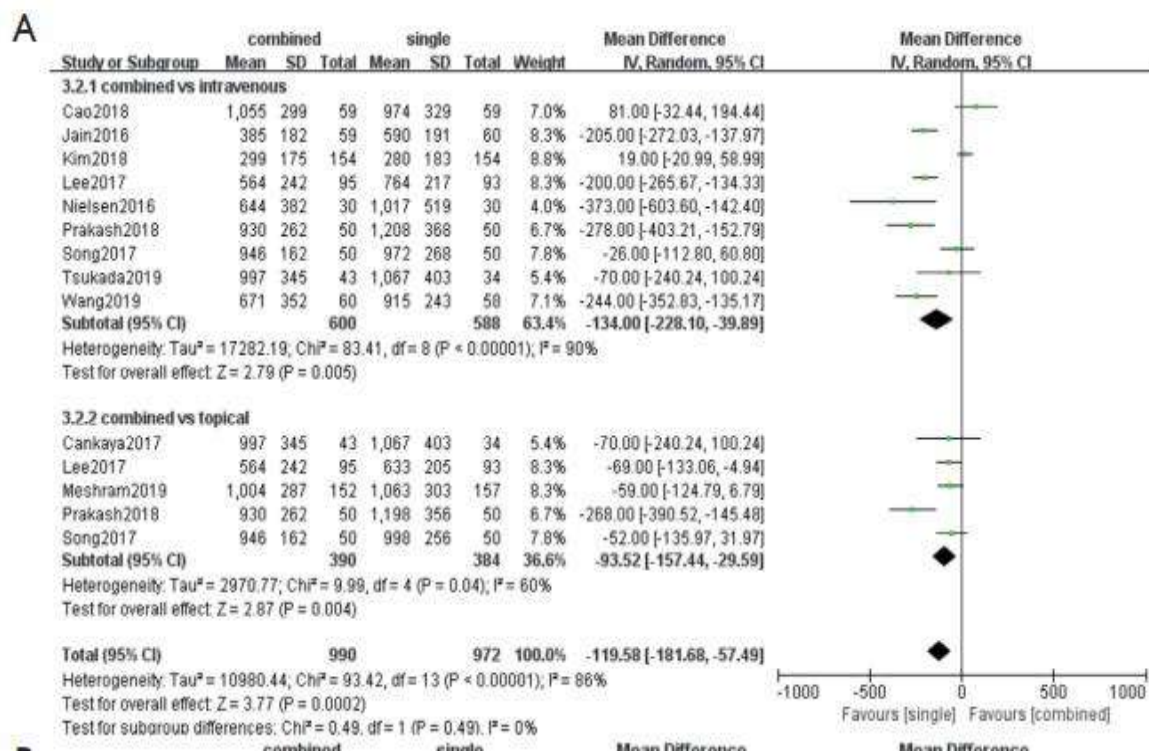


Figure 4 Forest plot between combined administration and single administration of tranexamic acid (A) blood loss. (B) Hemoglobin level. (C) Venous thrombotic events rate. (D) Transfusion rate.

FAITH-是否以表格和圖表總結試驗結果 (4)

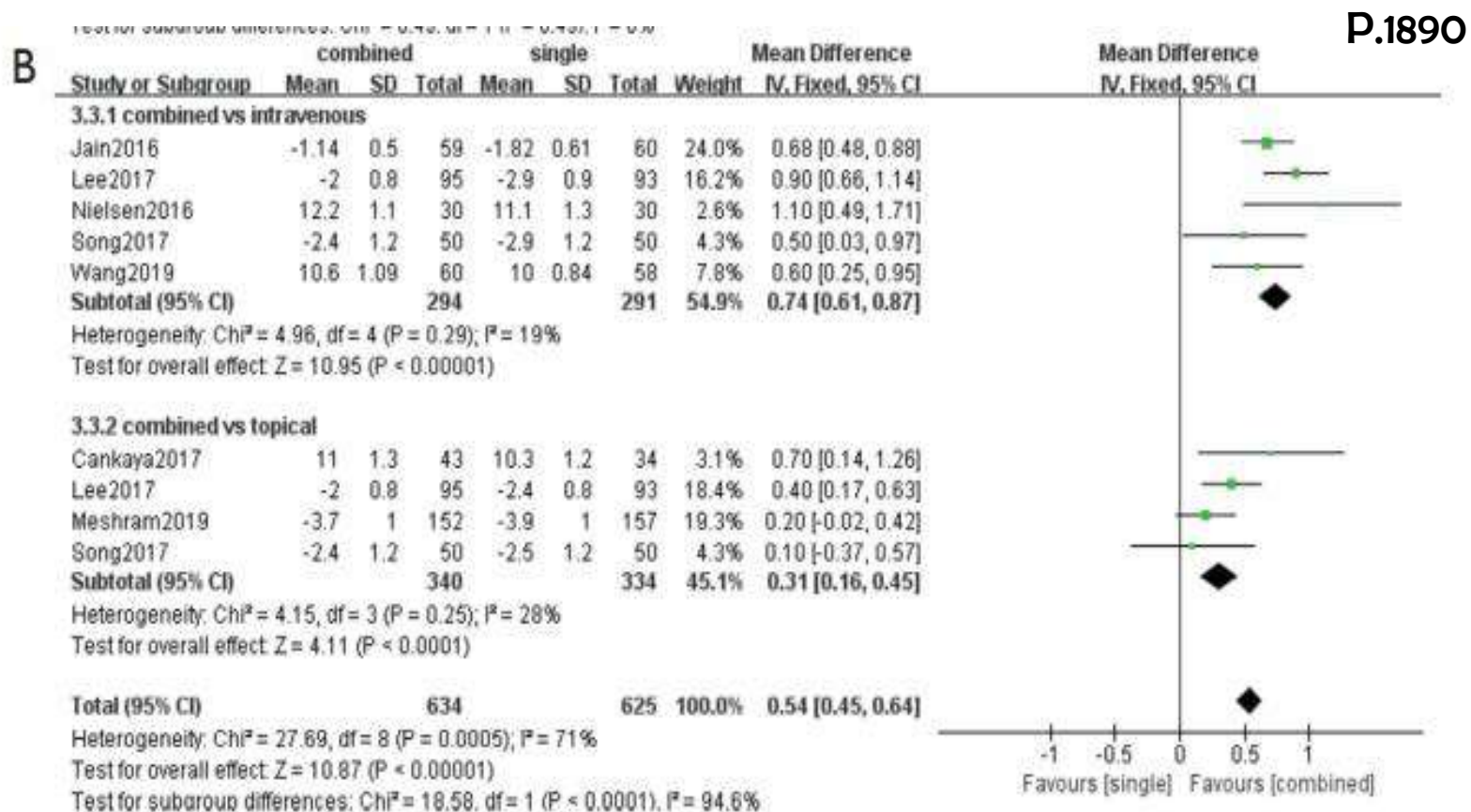


Figure 4 Forest plot between combined administration and single administration of tranexamic acid (A) blood loss. (B) Hemoglobin level. (C) Venous thrombotic events rate. (D) Transfusion rate.

FAITH-試驗的結果是否相近-異質性?

Discussion

P.1889

The heterogeneity of this study was small, but we still do subgroup analysis. In our meta-analysis, we found that subgroups had no significant effect on the overall effect of the analysis. We believed that TXA had a good effect on reducing blood loss in both bilateral TKA and unilateral TKA and among different races, TXA can also play a good effect. There are still many disputes about the best amount of TXA, but this meta-analysis did not compare the amount of TXA in different groups. Subgroup analysis showed that there was no significant difference between the high-dose group and the low-dose group, indicating that the use of low-dose TXA was equivalent to the use of high-dose TXA in reducing blood loss, but the optimal dose of TXA still needs further study. Some studies have shown that

根據其試驗結果，
發現異質性不大，

評

在理想情況下,各個試驗的結果應相近或具同質性,若具有異質性,作者應評估差異是否顯著(卡方檢定)。根據每篇個別研究中不同的 PICO 及研究方法,探討造成異質性的原因。



評讀總表

系統性文獻回顧品質

研究是否找到(Find) 所有的相關證據？	評讀結果：是
文獻是否經過嚴格評讀(Appraisal)？	評讀結果：是
是否只納入(Included)具良好效度的文章？	評讀結果：不清楚
作者是否以表格和圖表「總結」(Total up)試驗結果？	評讀結果：是
試驗的結果是否相近-異質性(Heterogeneity)？	評讀結果：是

結論

- Primary TKA個案，合併局部給藥+靜脈注射二種途徑，投與Tranexamic acid，相較於單一途徑使用Tranexamic acid(局部給藥、口服或靜脈注射)，更能顯著地降低總失血量與術後血色素下降率。
- 口服給予Tranexamic acid的效果，與靜脈注射或局部給藥的效果相仿。
- 任何一種給藥途徑之間，對於術後輸血及血栓形成，並無顯著差異。



限制、建議

- 對於有血栓、急性心肌梗塞或中風史的高危族群來說，仍需注意膝關節手術術後靜脈注射和口服Tranexamic acid的安全性和風險。
- 本文未將Tranexamic acid建議使用劑量、失血量計算方式、術後引流管照護等項目進行分析與探討。



(圖片取自:<https://englishlive.ef.com/zh-tw/blog/english-in-the-real-world/idioms-for->

回到臨床

- 本院骨科專科在臨床上僅有少數靜脈注射 Tranexamic acid，搭配引流管的使用及術後隔天監測血色素變化，手術室會與病房護理人員交班術中的失血量，病房護理人員也會三班紀錄引流管的引流量。



臺北市立萬芳醫院 - 委託財團法人臺北醫學大學辦理
Taipei Municipal Wan Fang Hospital (Managed by Taipei Medical University)

Q & A



依系統性文獻回顧之結論

- 是否同意TKR手術Tranexamic acid注射+口服合併使用可以減少術後失血量？



5票

21票

2票





感謝聆聽 恭請指教

