



Contents lists available at ScienceDirect

## International Journal of Surgery

journal homepage: [www.journal-surgery.net](http://www.journal-surgery.net)

## Best evidence topic

## How does subintimal angioplasty compare to transluminal angioplasty for the treatment of femoral occlusive disease?

S.G. Klimach<sup>a</sup>, N.D. Gollop<sup>b,\*</sup>, J. Ellis<sup>c</sup>, P. Cathcart<sup>c</sup><sup>a</sup>Brighton and Sussex Medical School, University of Sussex, Brighton, UK<sup>b</sup>The Norfolk and Norwich University Hospital, Norwich NR4 7UY, UK<sup>c</sup>The Queen Elizabeth Hospital, King's Lynn, Norfolk, UK

## ARTICLE INFO

## Article history:

Received 28 April 2013

Received in revised form

1 January 2014

Accepted 13 January 2014

Available online 28 January 2014

## Keywords:

Femoral occlusive disease

Subintimal angioplasty

Transluminal angioplasty

## ABSTRACT

A best evidence topic in surgery was written according to a structured protocol. The question addressed how subintimal angioplasty (SIA) compares to transluminal angioplasty (TA) for the treatment of femoral occlusive disease. One hundred and thirty two papers were found using the reported search; the 5 which represented the best evidence to answer the question are discussed. The evidence on this subject is limited; there are no randomised controlled trials (RCTs) comparing SIA to TA for pathologically equivalent lesions. However SIA remains a safe and effective alternative to surgical bypass grafting when TA cannot be performed.

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## 1. Introduction

A best evidence topic was constructed according to a structured protocol, as described in the International Journal of Surgery [1] Table 1.

## 2. Clinical scenario

A patient with high operative risk presents with femoral artery occlusive disease. Active treatment is indicated. Two interventional approaches are available which you feel should be considered in this case, however you are unsure which, subintimal angioplasty (SIA) or transluminal angioplasty (TA), will give better results in terms of safety, patency and outcome. You resolve to consult the literature to find outcomes data on each procedure.

## 3. Three part question

In patients receiving active treatment for femoral artery occlusive disease, does SIA or TA provide better results, in terms of patency, outcome and safety?

*Abbreviations:* ROS, retrospective observational study; SR, systematic review; DVT, deep vein thrombosis; SIA, subintimal angioplasty; TA, transluminal angioplasty; ABPI, ankle brachial pressure index; TASC, Transatlantic Inter-Society Consensus.

\* Corresponding author. Tel.: +44 (0) 1603 286286; fax: +44 (0) 1603 286428.

E-mail address: [n.gollop@doctors.org.uk](mailto:n.gollop@doctors.org.uk) (N.D. Gollop).

## 4. Search strategy

A search strategy was constructed using Medline and the PubMed interface: (subintimal AND angioplasty OR transluminal AND angioplasty; AND femoral AND occlusive AND disease) to identify articles published between from 1948 and February 2013. The search was duplicate filtered. Reference lists of key articles were also searched for further references.

## 5. Search outcome

A total of 132 papers were identified using the reported PubMed search. Of these 62 did not answer the research questions directly, 27 were not in English language, 22 were unrelated, 6 were solely concerned with technical aspects of the procedure, 5 were duplications, 4 were concerned with medical management, 4 were basic science articles, and 2 were unrelated case reports. Five represented the best evidence to answer the clinical question.

## 6. Discussion

Femoral artery occlusive disease represents an increasing healthcare burden. Bypass grafting remains the preferred route for reperfusion, but entails significant operative morbidity and mortality. Minimally invasive techniques have a role in the management of patients presenting with femoral artery occlusive disease who are un-suitable for open surgery. Two minimally invasive

**Table 1**  
Best evidence papers.

Author, date and country	Patient group	Study type and level of evidence	Outcomes	Key result	Comments
Bolia et al. 1994 Leicester UK [2]	24 limbs in 21 patients were treated by SIA (10) or TA (19)	Retrospective case series. Level 4 evidence	Technical success (%) TA SIA	100% N/A N/A	This early case series demonstrated SIA to be a safe and effective procedure. However failure to differentiate between outcomes achieved between SIA and TA limits the application of the authors conclusions to the current review.
Antusevas et al. 2008, Kaunas, Lithuania [3].	73 SIA and 75 TA were performed in 146 patients between June 2002 and August 2006.	Prospective observational study. Evidence level 4.	Initial technical success (%) SIA TA Primary patencies at 1, 6, 12, 24 months (%) ( <i>P</i> value) SIA 1 6 12 24 TA 1 6 12 24 Mean pre-procedure ABPI ( $\pm$ SD) SIA TA Mean post-procedure ABPI ( $\pm$ SD) SIA TA	64 (87.7) 61 (81.3) <0.001  84.9 $\pm$ 4.2 71.2 $\pm$ 5.1 68.5 $\pm$ 5.3 65.8 $\pm$ 5.2  81.3 $\pm$ 4.4 45.3 $\pm$ 5.7 42.7 $\pm$ 5.6 38.7 $\pm$ 5.5  0.34 $\pm$ 0.14 0.35 $\pm$ 0.12  09 $\pm$ 0.2 0.87 $\pm$ 0.23	This was a well conducted prospective study. The authors reported 16 minor complications furthermore conversion to bypass operation was required in 7 cases due to inability to perform SIA. The authors did not identify any peri-operative risk factors to be associated with worse long term outcome.
Kim et al. 2010 Tokyo Japan [4]	54 patients (63 limbs) with TASC-C or D limb ischemia underwent SIA between April 2006 and June 2008.	Retrospective case series. Level 4 evidence	Technical success (%) Patency at 12-months Major complications (%) Minor complications (%) Mean pre-procedure ABPI ( $\pm$ SD) Mean post-procedure ABPI ( $\pm$ SD) Re-intervention rate (%) Repeat SIA Bypass surgery Below knee amputation	59 (93.6) 33 (51.3) 0 (0) 3 [5] 0.43 $\pm$ 0.25 0.89 $\pm$ 0.16  12 (19) 10 (15.8) 9 (14.3)	This study was a retrospective case series describing the experience with SIA at a single institution, performed by a single team. This study was limited by its retrospective nature. Patients were selected for SIA due to their unsuitability for open surgery. The authors note that the high 12-month re-occlusion rate was a reflection of patient characteristics, 79.4% of cases were classified as TASC-D. The authors identified occlusion length, distal SFA involvement and distal run-off to be significantly associated with 12-month re-occlusion.
Met et al. 2008, Amsterdam, The Netherlands [5].	23 articles relating to SIA were identified published between 1994 and 2006.	Systematic review of cohort studies. Evidence level 2a.	Initial technical success (%) Clinical success (resolution of symptoms at 1-year, %) Primary patencies at 1-year (%) Complication rates (%)	80–90 50–70 50 8–17	Met et al. performed a systematic review of publications relating to SIA. They identified 23 publications which appeared to indicate that SIA is safe and effective alternative to bypass surgery and could be used a temporary measure or 'bypass sparing' procedure.
Markose et al. 2010, Leicester UK [6]	13 reports relating to SIA published between 2004 and 2009.	Systematic review of cohort studies, reviews and prospective and retrospective case series. Evidence level 2a.	Initial technical success (%) Primary patencies at 1-year (%) Primary patencies at 2-years Complication rates (%)	99.5–83 70–50 61–53 6.2–17	Markose et al. performed a systematic review of publications relating to. They identified numerous studies 13 of which were related to SIA. Their results indicate that SIA is a safe and effective procedure. However failure of included trials to directly compare SIA to TA when both procedures could be performed limits the applicability of these results to the current study question.

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