Fayoum University
Faculty of Medicine
Anesthesia Department

جامعة الفيوم
كلية الطب
قسم التخدير

Antistasis Retrograde Flow Vascular Catheter: A Novel Solution to Computational Fluid Dynamics Study Thrombogenicity: A

Background:

Catheter-related thrombosis (CRT) is a serious complication of vascular catheters. Retrograde catheter insertion has been shown to decrease pericatheter hemostasis and thrombosis, but it is technically challenging. The current in-silico trial is an analytical approach to evaluating different approaches to designing retrograde flow into a vascular catheter.

Methods:

The novel catheter design aims to provide antistasis retrograde flow (ASRF) of fluid through multiple backward-directed side openings, with a self-closing terminal opening to facilitate standard insertion. Four different models of the catheter were evaluated by computational fluid dynamic studies, with retrograde-angled openings of 15°, 30°, 45°, and 60° to the long axis of the catheter.

Results:

ASRF successfully reduced the areas of fluid stagnation in models with 15° and 30° openings. Models with 45° and 60° did not significantly reduce stagnation. ASRF is reversed by the main bloodstream after a few millimeters. The novel catheter design achieved a slightly higher saline flow rate compared with the standard catheter (89.75, 91.72, 94.13, and 94.26 mL/min for 15°, 30°, 45°, and 60° designs, respectively, versus 86.93 mL/min for the standard catheter).

Conclusion:

The novel ASRF vascular catheter reduces pericatheter fluid stasis and has the potential to reduce CRT. Further in vitro and in vivo trials are warranted to validate these findings and evaluate clinical efficacy.

Fayoum University
Faculty of Medicine
Anesthesia Department

جامعة الفيوم
كلية الطب
قسم التخدير

نوع البحث:

بحث مشترك منشور غير مشتق من رسالة وسبق تقييمه في لجنة ترقية د محمد محمد عبد الحق لدرجة استاذ وتم تقييمه جيد جدا وحصل (10.8) درجة. الدورة الثالثة عشر 2019 – 2022 بتاريخ 2022/08/05

المشرفين على البحث حسب الترتيب:

د. أحمد عبد العال أحمد، د. هاني محمود يسين، د. إيهاب فرج، د. محمد خالد حمزة، د. محمود حسين بحر، د. أحمد جودة أحمد، د. محمد فريد العمدي، د. عمرو سلام، د. محمد العياشي، د. محمد عبد الحق، د. أحمد مصطفى كمال، د. محمد عدلي الرميلي.

- مكان وتاريخ النشر:

Anesthesia and Analgesia.
Published 10/2020.
Anesth Analg 2020; 131:1281–90
ISSN: 0003-2999
Online ISSN: 1526-7598