operation in high-risk patients. In this systematic review, we assessed the outcomes of mitral valve-in-valve replacement.

**Methods:** A thorough computer-based search was performed using 4 major databases. We included studies utilising TMVIV replacement in failed bioprosthetic valves, mitral ring repairs and mitral clips. The 30-day and outcome of all-cause mortality, stroke, major bleeding and reintervention was analysed.

**Results:** Seventeen observational studies were included in the analysis which comprised of 558 patients (437 bioprosthetic mitral valves, 110 mitral rings and 11 mitral clips). The mean age was 75 years with 39% of patients being male. 42.7% (238 patients) had New York Heart Association class 3 or 4 symptoms. The mean Society of Thoracic Surgeons score was 12.5%. Mean preoperative left ventricular ejection fraction was 55.5%. Patients with underlying mitral valve disease included 13.1% (73 patients) with mitral stenosis, 28% (158 patients) with mitral regurgitation and 10% (58 patients) with mixed mitral disease. Overall analysis demonstrated a low 30-day all-cause mortality of 2.5%. The rates of stroke and bleeding were also low at 0.7% (4 patients) and 6.8% (38 patients) respectively. 2.7% (16 patients) required reintervention with 0.4% (2 patients) needing surgical replacement and 0.4% (2 patients) with further valve-in-valve procedure.

**Conclusion:** TMVIV is a safe and feasible option in patients with failed mitral valve prosthesis who are high surgical risk for re-operations.

http://dx.doi.org/10.1016/j.hlc.2019.06.572

---

**Abnormal Nail Fold Capillaroscopy: Findings in Patients with Chronic Total Occlusions (CTO)**

U. Allahwala 1, 2*, M. Ward 3, J. Weaver 3, R. Bhindi 1, 2

1 Department of Cardiology, Royal North Shore Hospital, Sydney, Australia
2 The University of Sydney, Sydney, Australia
3 Department of Cardiology, Royal Prince Alfred Hospital, Sydney, Australia

**Aims:** Nail fold capillaroscopy (NFC) allows a simple, non-invasive direct examination of the microvasculature. NFC abnormalities have previously been associated with a number of coronary artery disease processes, in particular microvascular dysfunction. We sought to determine the prevalence of NFC abnormalities in patients with a CTO.

**Methods & Results:** 81 patients presenting for coronary angiography between June 2018 and January 2019 were studied. NFC was performed in 77 patients using a standardised protocol, prior to coronary angiography. An abnormal NFC was defined as the presence of microhaemorrhages, dilated capillaries or tortuous capillaries. Of those patients who underwent NFC, 27 (35.1%) had a CTO, whilst 50 (64.9%) had non-obstructive coronary artery disease (CAD).

An abnormal NFC was seen more commonly in patients with a CTO as compared to those with non-obstructive CAD (33.3% vs 8%, *p* < 0.05). Patients with an abnormal NFC were more likely to have hypercholesterolaemia, than those without (100% vs 89.1%, *p* < 0.01). In patients with an abnormal NFC compared with those without, there was no difference in age, gender, presence of atrial fibrillation or other cardiovascular risk factors. In those with a CTO there was no correlation between NFC findings and degree of collateralisation.

**Conclusions:** An abnormal NFC is more commonly seen in patients with a CTO, which may reflect higher degree of coronary artery disease and microvascular dysfunction. NFC should be further investigated to determine its utility in routine cardiovascular screening and assessment (Fig. 1).

http://dx.doi.org/10.1016/j.hlc.2019.06.573

---

**Activated Clotting Time Does Not Predict Radial Access Bleeding Complications**

A. Bailey 5, M. Fryer, K. Hall, E. Hogg, E. Levy, S. Cox

Sunshine Coast University Hospital, Sunshine Coast, Australia

**Background:** In femoral access, activated clotting time (ACT) is used to guide sheath removal to reduce bleeding access site complications. Our local radial access protocol mandates immediate sheath removal followed by a standardised compression time irrespective of heparin dosing. We hypothesized that end-of-case ACT was an independent predictor of radial access bleeding complications.

**Methods:** We prospectively collected end-of-case ACT for the majority of procedures performed over a 3-month period and documented clinical bleeding events – forearm haematoma graded as per EASY criteria and pseudoaneurysm.

**Results:** Complete data was available for 235 patients, 52% of procedures were performed for acute coronary syndromes and 35% underwent PCI. The mean heparin dose was 5987 units (0–20 000 units) with a mean ACT 169 s (95–393). 8 patients experienced a significant bleeding complication – 6 patients with significant haematoma, 2 pseudoaneurysms.

---

**Activated Clotting Time Does Not Predict Radial Access Bleeding Complications**

A. Bailey 5, M. Fryer, K. Hall, E. Hogg, E. Levy, S. Cox

Sunshine Coast University Hospital, Sunshine Coast, Australia

**Background:** In femoral access, activated clotting time (ACT) is used to guide sheath removal to reduce bleeding access site complications. Our local radial access protocol mandates immediate sheath removal followed by a standardised compression time irrespective of heparin dosing. We hypothesized that end-of-case ACT was an independent predictor of radial access bleeding complications.

**Methods:** We prospectively collected end-of-case ACT for the majority of procedures performed over a 3-month period and documented clinical bleeding events – forearm haematoma graded as per EASY criteria and pseudoaneurysm.

**Results:** Complete data was available for 235 patients, 52% of procedures were performed for acute coronary syndromes and 35% underwent PCI. The mean heparin dose was 5987 units (0–20 000 units) with a mean ACT 169 s (95–393). 8 patients experienced a significant bleeding complication – 6 patients with significant haematoma, 2 pseudoaneurysms.
Acute Coronary Collaterals Reduce Mortality and Improve Left Ventricular Function in Patients Presenting with ST Elevation Myocardial Infarction (STEMI)

U. Allawala 1,2, D. Nour 1,4, M. Ray 1, H. Rasmussen 1, P. Hansen 1, G. Figtree 1,2, G. Nelson 1, J. Weaver 1, M. Ward 1, R. Bhindi 2,2

1 Royal North Shore Hospital, Sydney, Australia
2 The University of Sydney, Sydney, Australia
3 Department of Cardiology, Royal Prince Alfred Hospital, Sydney, Australia
4 James Cook University, Townsville, Australia

Aims: The rapid recruitment of coronary collaterals at the time of an ST elevation myocardial infarction (STEMI) is observed frequently during primary percutaneous coronary intervention (pPCI), although their impact on prognosis remains uncertain.

Methods & Results: We reviewed patients presenting for pPCI or rescue PCI from February 2012 to December 2018. 1,416 patients were included in the analysis. Mean age was 64.8 (±13.6) with 22.8% females, and mean BMI 27.3 kg/m² (±4.87). The left anterior descending artery was the most common culprit vessel (46.8%) followed by the right coronary artery (38.6%) and the left circumflex artery (14.5%). 1,099 (77.6%) had poorly developed collaterals (Rentrop grade 0/1), with 317 (22.4%) having well developed collaterals (Rentrop grade 2/3).

The presence of well-developed collaterals was associated with a lower in-hospital (2.4% vs 7.1%, p < 0.0001) and 1-year (7.5% vs 18.7%, p < 0.01) mortality and lower rates of left ventricular dysfunction (38.8% vs 68.3%, p < 0.001). On multivariate analysis, after correcting for age, sex and ischaemic time, coronary collaterals remained independently predictive of in-hospital mortality (p < 0.05).

Conclusions: In patients presenting with STEMI, well-developed collaterals is associated with improved left ventricular function and independently associated with lower in-hospital and 1-year mortality. The pathophysiological mechanism of collateral formation should be further studied to elucidate any potential therapeutic targets.