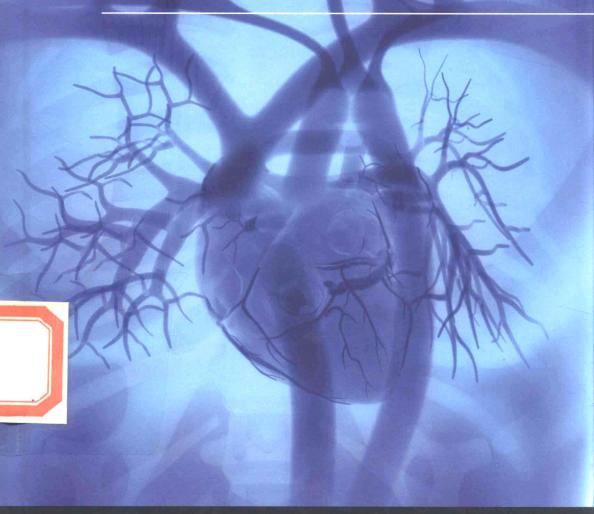
CORONARY

INTERVENTIONS AND SYNDROMS



# RESEARCH COLLECTION ON CORONARY INTERVENTIONS AND SYNDROMS



### **Research Collection on Coronary Interventions and Syndroms**

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Chapters from books edited by: Neville Kukreja and Mariano Brizzio

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### **Preface**

This book is a collection of selected and relevant previously published research, concerning the developments within the Coronary Interventions and Syndroms field of study. The collection includes scholarly contributions by various authors and edited by a group of experts pertinent to Cardiology and Cardiovascular Medicine. Each contribution comes as a separate chapter complete in itself but directly related to the book's topics and objectives. The target audience comprises scholars and specialists in the field.

### CORONARY INTERVENTIONS

Edited by **Neville Kukreja** 

### Transradial Approach for Coronary Interventions: The New Gold Standard for Vascular Access?

Antoine Guédès CHU Mont-Godinne, University of Louvain Belgium

### 1. Introduction

The perfect cardiac catheterization technique, including good diagnostic and therapeutic qualities, without risk and with no recovery time for the patient, does not exist. Obtaining initial access to the arterial circulation is the first and most frequent catheterization difficulty encountered by the interventional cardiologist during the procedure. Often, it is also the only difficult part of the exam for the patient because it may cause a vagal reaction or painful spasm. These procedural problems inevitably increase catheterization time and are sometimes the underlying causes of more significant complications. Arterial access is a crucial step of percutaneous cardiac procedures and therefore requires special attention.

Today, percutaneous coronary intervention (PCI) are usually performed via the femoral or radial arteries (a brachial approach may occasionally be required as third choice vascular access). Since the first demonstration of transradial approach feasibility in 1989, by Lucien Campeau, many studies have confirmed this initial experience and especially its safety and performances compared to transfemoral route. Nevertheless, a recent study reports that less than 2% of percutaneous coronary interventions were performed by a transradial approach in the United States between 2004 and 2007(1). The persistent discrepancy between current practice in vascular access site choice and known advantages of a radial access needs to be clarified, enlightened by recent data.

### 2. Short overview of complications related to arterial access site choice for PCI

Over the last three decades, advances in percutaneous coronary interventions techniques and contemporary pharmacotherapy have made these procedures safer and more reliable in a wide range of patients, often older and sicker than before.

### 2.1 Bleeding after percutaneous coronary interventions

In routine clinical practice, bleeding complications are a frequent non-cardiac outcome of therapy for acute coronary syndromes even in the case of an adequate arterial puncture technique. Aggressive antithrombotic regimens used in this setting even if highly powerful in reducing ischemic events, also expose patients to a higher rate of bleeding (related or not to the vascular access site).

More than two thirds of all bleeding complications involve the arterial access site and range from a local non significant hematoma to life-threatening bleeding (Fig. 1). The most common origins of bleedings not related to arterial access are gastrointestinal followed by cardiac tamponade and intracranial haemorrhage (2,3).

Retroperitoneal haemorrhage is more difficult to classify because of its double potential aetiology (often linked to manipulations related to a femoral approach but rarely occurring spontaneously in the case of anticoagulation and/or antiplatelet therapy). Retroperitoneal bleeding leading to a major bleed is reported to occur in approximately 0.1% to 0.3% of patient treated by a femoral access but is maybe an underestimate (2,4).

Risk factors for such complications are now well identified and could be divided in four categories (see Table 1).

Clinical Factors	<ul> <li>- Advanced age</li> <li>- Female gender</li> <li>- Low body weight/obesity</li> <li>- Prior bleeding</li> <li>- Severe hypertension</li> <li>- Heart failure</li> <li>- Peripheral vascular disease</li> <li>- Acute coronary syndrome</li> </ul>
Biochemical Factors	- Renal insufficiency - Anemia - Diabetes
Procedural Variations	<ul> <li>- Femoral Access (versus Radial Access)</li> <li>- Increased sheath / Catheter size</li> <li>- Prolonged sheath time after procedure</li> <li>- Intra aortic Balloon Pump</li> <li>- Concomitant venous sheath</li> <li>- Need for repeat intervention</li> </ul>
Treatment Combinations	<ul> <li>Antiplatelet therapy (dosage, efficacy, timing, duration)</li> <li>Overdose of anticoagulants (+/- GP IIb/IIIa inhibitors)</li> <li>Crossover / combinations of anticoagulants</li> <li>Thrombolytic agents</li> </ul>

Table 1. Factors associated with a higher bleeding risk (5-10)

Large randomized trials and registries with "real world" populations of patients have clearly identified clinical characteristics conferring a higher risk of bleeding: advanced age, female gender, obesity, low body weight, chronic renal disease, peripheral vascular disease and a previous history of bleeding. Procedural predictors for an increased bleeding risk include faulty puncture technique, sheath size, prolonged sheath time, use of glycoprotein (GP) IIb/IIIa inhibitors, vascular closure devices, intensity/duration of anticoagulation with heparin, but also vascular access strategy using femoral rather than radial artery(3,9,11-17).

The main difficulty encountered when comparing trials which study the true incidence of haemorrhagic events linked to vascular access options remains the lack of a precise definition for this complication (18-20) or at least of a consensus taking into account main parameters in order to establish a bleeding severity score (clear identification of bleeding site, haematocrit / haemoglobin drop, hemodynamic consequences, treatments required...).

Even if some authors (21) report a significant reduction in the incidence of major femoral bleeding complications over time (from 8.4 % in 1995 to 3.5 % in 2005), the single effective way to reduce majors bleeding related to a coronary angiography or intervention procedure, according to recent data, is to use radial access (2,11,22-24). In experts hands, this strategy allows a 50 to 75 % reduction in major bleeding events (24) with the greatest absolute benefit for obese patients and in the setting of acute myocardial infarction (primary or rescue coronary angioplasty). Therefore, radial access should be promoted as the preferential access site for percutaneous coronary interventions. Nevertheless the keys to preventing bleeding complications are well known: good knowledge and recognition of predisposing factors, meticulous examination of the access site before the puncture follow by a careful sheath placement in the artery without forceful manoeuvre and discontinuation of heparin at the end of the procedure.

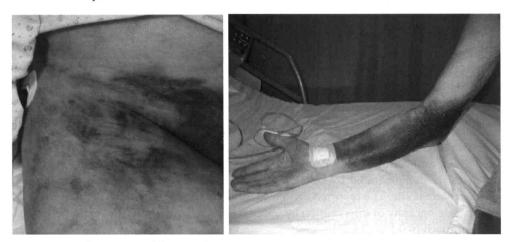


Fig. 1. Large right groin and forearm hematomas.

### 2.2 Other frequent complications related to arterial access site

Other significant access site related complications encountered after a catheterization procedure are pseudoaneurysm, arterio-venous fistula, femoral laceration, femoral thrombosis with or without distal embolization, and any need for a surgical exploration or repair. Less frequently groin infection (puncture site abscess), neural damage and venous thrombosis are observed.

### 2.2.1 Pseudonaneurysm

A pseudoaneurysm is defined as an encapsulated hematoma or cavity (contained by surrounding tissues) communicating with the lumen of an artery because of a localized disruption of the media (Fig. 2). It mainly occurs after an inadequate artery compression