



Access Site Practice and Procedural Outcomes in Relation to Clinical Presentation in 439,947 Patients Undergoing Percutaneous Coronary Intervention in the United Kingdom

Karim Ratib, MB ChB,* Mamas A. Mamas, BM BCh, DPHIL,†† Simon G. Anderson, MBChC, PhD,‡ Gurbir Bhatia, MD,§ Helen Routledge, MD,|| Mark De Belder, MA, MD,¶ Peter F. Ludman, MA, MD,# Douglas Fraser, MB BChIR,† James Nolan, MD,* for the British Cardiovascular Intervention Society and the National Institute for Cardiovascular Outcomes Research

ABSTRACT

OBJECTIVES This study sought to determine the relationships among access site practice, clinical presentation, and procedural outcomes in a large patient population.

BACKGROUND Transradial access (TRA) has been associated with improved patient outcomes in selected populations in randomized trials. It is unclear whether these outcomes are achievable in clinical practice.

METHODS Using the BCIS (British Cardiovascular Intervention Society) database, we investigated outcomes for percutaneous coronary intervention procedures undertaken between 2007 and 2012 according to access site practice. Patients were categorized as stable, non-ST-segment elevation acute coronary syndrome (NSTEMACS) and ST-elevation acute coronary syndrome (STEMACS). The impact of access site on 30-day mortality, major adverse cardiac events, bleeding, and arterial access site complications was studied.

RESULTS Data from 210,260 TRA and 229,687 transfemoral access procedures were analyzed. Following multivariate analysis, TRA was independently associated with a reduction in bleeding in all presenting syndromes (stable odds ratio [OR]: 0.24, $p < 0.001$; NSTEMACS OR: 0.35, $p < 0.001$; STEACS OR: 0.47, $p < 0.001$) as well as access site complications (stable OR: 0.21, $p < 0.001$; NSTEMACS OR: 0.19; STEACS OR: 0.16, $p < 0.001$). TRA was associated with reduced major adverse cardiac events only in patients with unstable syndromes (stable OR: 1.08, $p = 0.25$; NSTEMACS OR: 0.72, $p < 0.001$; STEACS OR: 0.70, $p < 0.001$). TRA was associated with improved outcomes compared with a transfemoral access (TFA) with a vascular closure device in a propensity matched cohort.

CONCLUSIONS In this large study, TRA is associated with reduced percutaneous coronary intervention-related complications in all patient groups and may reduce major adverse cardiac events and mortality in ACS patients. TRA is superior to transfemoral access with closure devices. Use of TRA may lead to important patient benefits in routine practice. TRA should be considered the preferred access site for percutaneous coronary intervention. (J Am Coll Cardiol Intv 2015;8:20-9)
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From the *Department of Cardiology, University Hospital of North Staffordshire, Stoke-on-Trent, United Kingdom; †Manchester Heart Centre, United Kingdom; ‡University of Manchester, Manchester, United Kingdom; §Heart of England National Health Service Trust, west Midlands, United Kingdom; ||Worcestershire Royal Hospital, Worcestershire, United Kingdom; ¶James Cook University Hospital, Middlesbrough, United Kingdom; and the #University Hospital Birmingham, Birmingham, United Kingdom. Dr. de Belder has received speakers fees from Boehringer Ingelheim and Cordis; and travel expenses from Medtronic. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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Over the past decade, transradial access (TRA) has become the preferred access route for percutaneous coronary intervention (PCI) in the United Kingdom (1). This has been driven by the advantages that TRA offers over other access sites with reduced vascular access complications, earlier ambulation, improved patient comfort, and reduced procedural cost (2-4). Additionally, development of dedicated TRA equipment has shortened the learning curve (5), facilitated treatment of complex coronary lesions (6-8), and, in experienced hands, reduced the rate of cross over to transfemoral access (TFA) in all patient subgroups (9-12). Importantly, TRA is associated with a reduction in the need for blood transfusion (13) and a reduction in major bleeding (14). TRA has also been associated with reduced mortality following PCI for ST-segment elevation acute coronary syndrome (STEACS) in both observational (15) and randomized studies (12,16,17). Prevention of access site bleeding has been postulated to be an important mechanism through which use of TRA reduces mortality. This hypothesis is supported by randomized trials in which pharmacological measures that reduced bleeding also reduced mortality (18-20).

The risk of post-PCI bleeding is variable and dependent on the syndrome with which patients present. In PCI for STEACS and non-ST-segment elevation acute coronary syndromes (NSTEMACS), the presence of thrombus and plaque instability means that more potent antithrombotic regimes are often required. Additionally, patients with STEACS have higher inherent risks of bleeding by virtue of their presentation (21), as well as the time-sensitive nature of primary PCI allowing for less patient pre-selection. Conversely, patients with stable syndromes can frequently be treated using less potent antithrombotics and more time is available to stratify and select patients before electing to undertake PCI. These factors may act to enhance the beneficial effects of TRA in unstable patients.

To date, TRA has largely been studied in selected populations enrolled in randomized controlled trials, small observational studies, or large registries in which transfemoral access (TFA) is the dominant access site. Although many of these studies have demonstrated favorable outcomes associated with TRA, this may have been driven by PCI procedures undertaken at a few early adopting specialist centers and may not translate to a national setting in which TRA is more widely adopted. The purpose of this study is to document patient outcomes in relation to access site practice and clinical presentation in a

large population of patients undergoing PCI in an environment where TRA is frequently employed.

METHODS

THE BCIS PCI DATABASE. This study is based on analysis of data collected by British Cardiovascular Intervention Society (BCIS) under the auspices of the National Institute for Cardiovascular Outcomes Research. BCIS was formed in 1988, and since its inception, has collected data to monitor the practice of coronary intervention in the United Kingdom. The BCIS PCI database aims to record all PCI procedures performed in every hospital in the United Kingdom (22). Annual reports on PCI activity from 1992 onward are publicly available for download from the society's website. As of 2011, 97.3% of all procedures in the United Kingdom were recorded in the database. The database records patient demographic details, comorbid conditions, indication for PCI, procedural details, and outcome data. In total, 113 variables are recorded for every procedure. The full list is available to download from the BCIS website. To the end of the year 2012, over 500,000 procedures were recorded on the database with over 90,000 procedures being added each year. In England, data on mortality is linked to each procedure via the National Health Service central register using a patient's individual National Health Service number. It is a legal requirement that all deaths in the United Kingdom are registered with this body.

STUDY POPULATION AND DEFINITIONS. For the purpose of this study, we performed a retrospective analysis of all PCI procedures recorded in the BCIS database over a 6-year period from January 1, 2007, to December 31, 2012, where access site was limited to either TRA or TFA (use of either or both radial arteries was classed as TRA and use of either or both femoral arteries was classed as TFA). Patients recorded as undergoing PCI using mixed access sites (e.g., TRA and TFA) and other access sites (such as brachial artery access) were excluded. The patients were divided into 3 cohorts based on indication for PCI; stable (elective PCI in cardiac biomarker-negative patients), NSTEMACS (biomarker-positive or -negative patients admitted to hospital with an unstable pattern of cardiac ischemia), and STEACS (primary, rescue, and facilitated PCI).

ABBREVIATIONS AND ACRONYMS

- ACS** = acute coronary syndrome(s)
- BCIS** = British Cardiovascular Intervention Society
- CABG** = coronary artery bypass graft(s)
- CI** = confidence interval
- MACE** = major adverse cardiac event(s)
- NSTEMACS** = non-ST-segment elevation acute coronary syndrome(s)
- OR** = odds ratio
- PCI** = percutaneous coronary intervention(s)
- STEACS** = ST-segment elevation acute coronary syndrome(s)
- TFA** = transfemoral access
- TIMI** = Thrombolysis In Myocardial Infarction
- TRA** = transradial access
- VCD** = vascular closure device(s)

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