

# Understanding the role of female sex in patients undergoing PCI with rotational atherectomy

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## Related article

by Sabatowski et al.

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Cardiovascular disease is the leading cause of death in women [1]. Female sex is associated with worse outcomes after percutaneous coronary intervention (PCI), suffering from disproportionately higher rates of death, stroke, repeat revascularization, and vascular complications [2–4]. Moreover, the female sex is an independent predictor of death, myocardial infarction, stent thrombosis, and target lesion revascularization after PCI of calcific coronary lesions [5].

Calcific coronary lesions represent a challenging scenario of PCI due to uncrossable or un-dilatable lesions and because of the risk of stent malapposition and stent under-expansion, leading to a higher rate of intrastent restenosis and stent thrombosis [6]. To overcome these unfavorable scenarios, optimal lesion preparation is fundamental, and several devices are currently available. Non-compliant and cutting/scoring balloons, aiming at acceptable lesion preparation, are not always enough to adequately break the intimal calcium. Rotational atherectomy (RA) is a specific technique adopted for the treatment of complex lesions, especially those with heavy calcification that cannot be adequately dilated with conventional balloons or stents because of balloon rupture or stent under-expansion. RA induces lumen enlargement by the physical removal of plaque and the reduction of plaque rigidity, facilitating proper dilation [7].

Patients treated with RA belong to a population with a high burden of comorbidities. This specifically occurs in the case of heavily calcified coronary arteries, which are usually present in patients with chronic kid-

ney disease, diabetes, hypertension, previous coronary revascularizations, and at older age [8]. Thus, in this subset of lesions requiring RA, patient vulnerability and lesion complexity constitute an unfavorable combination that makes the procedure prone to complications. In this high-risk population with calcified coronary lesions, mechanical lesion preparation plays a crucial role in facilitating or enabling percutaneous revascularization [9].

In this issue of *Kardiologia Polska* (*Kardiologia Pol*, *Polish Heart Journal*), Sabatowski et al. [10] sought to highlight sex-related trends in a large national (Polish) registry from 2014 to 2020 and to identify factors associated with the risk of periprocedural complications and death after PCI with RA. The authors retrospectively selected 5 177 (0.7%) patients treated with RA out of 75 1113 patients undergoing PCI during the abovementioned period, with 3 552 male (68.6%) and 1 625 female patients.

The authors found that female sex was an independent predictor of periprocedural death and overall complications among patients treated with RA PCI. More specifically:

- Female patients treated with RA PCI were older compared to males. Also, diabetes and arterial hypertension were more prevalent in women. Furthermore, the clinical presentation was different, with women presenting more frequently with acute coronary syndrome;
- Considering periprocedural complications in general, the overall rate was greater in women compared to men; periprocedural death and cardiac arrest rates were also greater in female patients;

- Risk factors of the increased rate of periprocedural death in RA PCI were female sex, multi-vessel disease, cardiac arrest at baseline, and radial vascular access;
- Risk factors of periprocedural complications in general for RA PCI were: again female sex along with bifurcation PCI, radial access, low molecular weight heparin, cardiac arrest at baseline, multi-vessel disease, etc.

In line with these observations are data from a recent registry [11] showing that women had a higher rate of myocardial infarction at one year following complex PCI (even after adjusting for potential confounders), even though they present with less challenging lesions than men. Moreover, Ford et al. [12] showed that women undergoing RA PCI are at greater risk of bleeding complications and coronary perforations leading to cardiac tamponade.

On the other hand, a recent propensity score-matched population study showed that differences between sexes were not observed in relation to long-term major adverse cardiovascular and cerebrovascular events (including death, acute coronary syndrome and stroke) in patients undergoing PCI with RA for severely calcified coronary artery stenoses [13].

Most of the studies evaluating sex differences in RA PCI are retrospective registries, from which no definitive conclusions can be drawn. However, it seems that the increased complication rate related to sex could be attributed to the following two factors:

- Comorbidity factor. In most studies, females are older, and more frequently present with diabetes, hypertension, and acute coronary syndrome, which are related with a higher risk of complications and death.
- Anatomical factor: (1) Women undergoing RA PCI are more frequently older and suffer from hypertension, both of which are associated with tortuous and more fragile vessels prone to dissections and perforations; (2) Women usually weigh less, which is related to smaller and potentially more fragile vessels leading to perforations and vascular access complications. Operators tend to oversize more frequently in small vessels which leads to increased complication rates.

Operators and clinicians should take into consideration these specific anatomic and comorbidity factors associated with the female sex to avoid potential complications. Vascular access selection, precise sizing (materials and devices), intravascular imaging, and mainly careful patient selection should improve outcomes in RA PCI in female patients.

### Article information

**Conflict of interest:** None declared.

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