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## Commentary: 1, 2 or 3 arterial grafts? One is not enough!

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*“There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain of its success, than to take the lead in the introduction of a new order of things.”*

—Niccolò Machiavelli, *The Prince*, 1532

Gilmore and colleagues<sup>1</sup> summarize the latest literature informing the decision to use a second or third arterial graft in coronary artery bypass grafting (CABG). They review the complementary, rather than competitive, attributes of the right internal thoracic artery, the radial artery (RA), and the gastroepiploic artery when used in conjunction with the left internal thoracic artery (LITA). Despite the equivalent long-term survival on an intention-to-treat basis of the ART trial between bilateral internal thoracic artery (BITA) CABG and single internal thoracic artery–based CABG, the authors correctly point out there has recently emerged fairly compelling data supporting the benefits of multiple arterial CABG whether that be in the form of BITA or LITA with supplemental RA grafts.<sup>2-5</sup> Of note, the noted BITA survival advantage may not be due to superiority of BITA grafts but rather due to unmeasured confounders that cannot be mitigated by sophisticated statistics.<sup>6</sup> Further, it should be remembered that BITA grafting is associated with (1) increased risk of deep sternal wound infections, (2) increased operative time inherent in consecutive graft harvesting with BITA rather than concurrent graft harvesting with RA, (3) general easier technical aspects of the RA compared with BITA grafting and most importantly,



One is not enough.

### CENTRAL MESSAGE

In our continual quest for quality, the traditional single arterial CABG is no longer enough.

(4) equivalent long-term survival of BITA versus LITA/RA.<sup>5</sup> Hence, the RA may be an easier starting point for surgeons beginning their journey from single arterial CABG to multiarterial CABG.

Given the title of this manuscript, a natural logical question is whether there is incremental value of additional arterial grafts beyond two? Given the less than 10% use rate of multiple arterial grafting in contemporary CABG, not surprisingly, extended (>2) arterial grafting is quite rare, with only 0.5% of patients within the Society of Thoracic Surgeons Database receiving 3 or more arterial grafts.<sup>7</sup> Although data on the value of extended arterial grafting are sparse, there are reports documenting survival benefits of 3 versus 2 arterial grafts.<sup>8-10</sup> Importantly, there are no reports of adverse outcomes with increasing arterial grafts.

Driving change and innovation is difficult yet essential for the continued relevancy of our specialty and in the interests of our patients. Transitioning from traditional single arterial CABG to multiarterial CABG may prevent 10,000 annual deaths among patients undergoing CABG and add an additional 64,000 patient years of life over a decade.<sup>11</sup> Moreover, only multiarterial CABG, in contradistinction to single arterial CABG, has been shown to have superior outcomes to percutaneous revascularization techniques.<sup>12</sup> Transitioning from single arterial to multiarterial grafting will need to be tailored to the specific culture, the surgical experience, and available resources of a given organization. It should be a gradual, sustained, multidisciplinary team-based process rather than sporadic, occasional, and individual-based, as there is compelling data showing that occasional multi arterial use is problematic.<sup>13,14</sup>

In the value-based health care of the 21st century, one arterial graft is simply not enough.

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