Editorial comment
The challenge of innovation

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The paper of Citterio et al.[1] in this issue of the *Italian Heart Journal* reports a clinical experience with minimally invasive cardiac surgery, carried out using the Heartport system for cardiopulmonary bypass, aortic occlusion and delivery of cardioplegic solution.

The technique is rather complex and certainly more demanding and time-consuming than conventional surgery. However, the operative results obtained by the authors are quite acceptable with a low mortality and a low rate of hospital complications. Awareness of the potential risks associated with the Heartport system has allowed an appropriate selection of the patients and a congruous decision-making process in the strategy of care.

As pointed out by the authors, rigorous exclusion criteria have to be respected and only patients without peripheral vascular disease, aortic insufficiency, dilation of the ascending aorta, previous coronary operation, depressed cardiac function, and pulmonary dysfunction should be candidates for Port-access cardiac surgery.

An accurate selection process is the prerequisite for success when innovative procedures are introduced in clinical practice.

The discipline of cardiothoracic surgery has always been one of constant innovation. When conventional surgery has reached a plateau and no further improvement in results can be expected, innovation is an obligation.

In the last few years, the rapid development of new technology has been leading the surgeons to introduce new methods to correct congenital and acquired heart diseases[2]. The extraordinary concomitant progress in the field of interventional cardiology has certainly been a strong stimulus for surgeons to draw from their imagination to find innovative surgical solutions for the future.

All changes in the techniques have been in the direction of a less invasive approach in order to reduce the overall trauma of the operation, to decrease the hospital stay, to favor fast recovery and resumption of normal lifestyle.

Although scientific evidence of the superiority of less invasive cardiac surgery is presently lacking, smaller incisions are expected to be associated with less bleeding, lower infection probability and satisfactory cosmetic results.

Some significant innovations recently introduced in the surgical arena are listed in table I.

Coronary revascularization on a beating heart has rapidly been expanding and is now quite standardized[3]. The procedure is relatively easy to perform, and is less expensive than the conventional operation carried out with cardiopulmonary bypass. As a consequence, the indications for off-pump coronary artery bypass graft are now larger and in many institutions the majority of patients submitted to surgical coronary revascularization are operated on without extracorporeal circulation.

Similarly, the use of endovascular prostheses is extremely attractive, espe-

Table I. Innovations recently introduced in the surgical arena.

Off-pump coronary artery bypass graft
Minimally invasive surgery (direct or video-assisted)
Robotics
Endovascular prostheses
Automatic anastomoses

cially in high-risk situations like type B aortic dissection, traumatic aortic rupture, and descending thoracic aorta aneurysm[4]. Such a less invasive approach is particularly convenient when the general condition of the patient is poor and severe comorbidities are present.

Minimally invasive surgery by means of the Heartport system as performed by Citterio et al.[1] on the other hand is expanding slowly because of the complexity of the procedure and the high cost. Furthermore, the benefit of this technique over the conventional approach has not been demonstrated yet. The same is true for robotic surgery which is only carried out in a few institutions and in a few circumstances[5]. Robotic technology however is expected to evolve in the next few years and new developments leading to extended surgical applications are likely to occur.

Special devices to perform automatic anastomoses have been proved to be quite effective and to facilitate coronary surgery under special circumstances, but their application is still limited by the high cost[6].

A new procedure is always demanding and associated with some degree of imponderability because of the lack of scientific knowledge and experience. In addition, an optimal interaction among the members of the operating team facing a new technology has to be constructed and this requires time and practice. The surgeon should be aware of all the above, and for the safety of his patient he should be prepared to convert the new procedure into the conventional one at any moment.

The process of innovating is challenging because a learning curve is necessarily present with potential risks for the patients.

Determination and courage are needed, but more than everything else surgeons should be concerned about the safety of their patients and should protect them from possible additional risks.

The introduction of a new procedure invariably requires a careful patient selection and a great responsibility with regard to decision-making at any moment in the course of the pre-, intra- and postoperative care.

The end result of all these efforts is expected to be a better treatment for our patients.

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