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Apropos of the first malleable lung retractor to facilitate extrapleural harvesting of the internal thoracic artery. Reply

A propósito del primer separador retráctil de pulmón para facilitar la disección extrapleural de la arteria torácica interna. Respuesta

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To the Editor:

We appreciate the letter from Rodríguez León *et al*¹ where they made a linguistic analysis of our article²

and questioned the quality of the bibliographical review carried out as part of its writing. It is surprising that –although it deals with specific technical aspects of coronary surgery– our paper has drawn the attention of colleagues with relatively little experience in the field. Perhaps this is the cause of their doubts, which we will try to clarify with great satisfaction. But first, some points need to be made here.

When the history of internal mammary (thoracic) artery (IMA) dissection procedures has not been thoroughly studied, it is mistakenly thought that its skeletonized harvesting was an achievement in the evolution of coronary surgery; well, it really happened the other way around. When Canadian surgeon Arthur Martin Vineberg first implanted an IMA

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into the left ventricular myocardium of a human being on April 28, 1950, he only freed the arterial segment between the 4th and 6th intercostal spaces from the chest wall, as functions of its accompanying vein or tissue pedicle were not required. And, in fact, he was still doing so when in 1966, the anatomical peculiarities of a patient forced him to approach the chest through a median longitudinal sternotomy and completely dissect the right IMA to implant it³. Years earlier, probably on March 17, 1958 (the exact date is unknown⁴) William Polk Longmire Jr. had anastomosed a coronary artery for the first time, in a desperate transoperative effort to save his patient's life^{5,6}. It is difficult to specify which dissection technique he used, but from his previous experience using IMA blood flow to irrigate the jejunum in the thoracic cavity, it may be assumed that he only released the artery during his historic surgery³.

It was not until 1959 that William Horace Sewell theorized about the supposed advantage of venous vessels in mammary artery implantation to drain excess blood and prevent myocardial hematomas. We have not been able to find the exact date when he first performed his so-called "pedicle operation" on humans, but it was probably in late 1962 or January 1963. This confirms that, although the North Carolina surgeon's concern was unfounded, since the presence of hematomas in patients operated on by the Vineberg technique was never demonstrated, the pedicled IMA harvesting was actually an attempt to improve the procedure for implanting a skeletonized artery, as it was promoted at that time.

It would also be wrong to claim that, in his initial work at the Cleveland Clinic in Ohio, Favaloro used the pedicle technique. He himself acknowledged in one of his autobiographical articles⁷ that, although he began as a surgeon at that facility in 1963, it was not until 1965 that he started dissecting the IMA with its surrounding vein and tissue, considering it a faster procedure with less risk of trauma. Then, it was the pedicled technique that evolved from the skeletonized one, and still today, it is the technique of choice for most cardiac surgeons in the world.

A number of South American and some American cardiac surgeons, whose training has been influenced by the Cleveland Clinic school, refer to Favaloro as the father of coronary artery bypass grafting. They conveniently forget that the Argentinean himself rejected that moniker⁸, probably aware that he was not the progenitor of any of the graft techniques, truly conceived and executed for the first time by

other surgeons who shared his same historical moment, but were more daring than he was. Favaloro's leading role in consolidating aorto-coronary bypass graft surgery in the clinical arena is undeniable, but if anyone wants to prove a true father of that procedure, Vineberg or Longmire would have more credentials to qualify for the historical distinction.

Going back to the subject that motivated the letter of Rodríguez León *et al*¹, in relation to the alleged misinterpretation of what Cunningham wrote in 1992, it is important to note that the text in our article is not in quotation marks, since it was not intended to be a literal translation. While Cunningham's work has merits, we would never endorse a literal translation of that particular sentence, as we disagree with the American author's emphatic statement that a malleable (classical) lung retractor provides excellent exposure during proximal IMA harvesting. No surgeon, with a basic experience in internal mammary artery dissection would categorically state that a classic lung retractor always provides excellent exposure of the artery segment; yes, it could, but the opposite may also happen. Our team is quite experienced in the use of Allison's malleable lung retractor to assist internal mammary artery harvesting, as shown in panel B, figure 2 of our previously published article in this journal². It should be mentioned that, in most cases it is another member of the team who uses it; which keeps the surgeon from freely maneuvering, who, when tired, will relocate it, making it difficult to properly visualize the operating field. This hampers dissection and increases the risk of damaging the artery or lung. This is why we decided to elaborate a retractable device, which adheres to the sternal retractor. Although such an instrument could be deployed in any thoracic surgery, it was specifically designed to retract the lung during internal mammary artery harvesting, as we specified when we presented the initial results of its implementation to the scientific community⁹.

Apparently, Rodríguez León *et al*¹ slightly misinterpreted the term "malleable". All thoracic surgery practitioners are perfectly familiar with lung retractors, which have probably existed since the dawn of the specialty. We must bear in mind that most of the great milestones in lung surgery took place before 1940. And although it is difficult to pinpoint when a device was first used to retract the viscera, it can be safely stated that, prior to ours, none was manufactured with the specific intention of retracting the lung during dissection of the internal mammary ar-

tery.

Probably all lung retractors are malleable, although the term does not appear in their denomination. It must not be interpreted as a “last name”; it simply means that its metal structure can change shape without breaking, a necessary feature to deal with that organ through a thoracotomy. In our facilities we do have the Zaikind lung retractor, mentioned by Rodríguez León *et al*¹, but we hardly use it for this purpose, since its narrow blade makes it difficult to retract the lung, which is not the case with Allison's classic racket-shaped retractor.

We are sure that Cunningham's team used some kind of lung retractor during IMA harvesting. Obviously one designed for lung surgery and which heart surgeons have always employed since they lacked one specifically manufactured to facilitate this artery dissection. Not a single photograph of the thousands of articles devoted to coronary surgery shows a retractor with these characteristics. But perhaps the strongest evidence of its non-existence is the 2015 publication by Efthymiou and Weir¹⁰. They propose the angled arrangement of hemostatic clamps for that purpose and suggest the future manufacture of a more sophisticated device^{9,10}; one that would help splint the lung away if retractors currently used for dissection of the internal mammary artery were modified.

Those who do not perform this type of surgery are probably unaware that a specifically designed sternal retractor is also used during internal mammary artery dissection; which is replaced at the end of the procedure by another one with different characteristics. This second retractor is required during the construction of the grafts and will no longer allow proper visualization of the IMA bed. When, in his article, Cunningham points out, “While the retractor is still in place (...) the loose tissue connecting the superomedial pleural reflection to the chest wall is divided with cautery”, he is simply referring to that special sternal retractor used during IMA harvesting, not the pulmonary one, as Rodríguez León *et al*¹ mistakenly interpreted. At this stage of the technique description, the artery has already been dissected and Cunningham made it rightly clear because once the “mammary retractor” –as surgeons generally call it– is removed, access to the aforementioned anatomical region will be more difficult.

Although Rodríguez León *et al*¹ refer that “a number of lung retractors are currently available to perform such a procedure as well as other devices with

the same objective in different cardiac surgery modalities”, it is important to explain that the main function of our retractor is to facilitate extrapleural harvesting of the internal mammary artery. The retractors they refer to as “already existing” are, undoubtedly, another kind.

Concerning the article by Kumar *et al*¹¹, they obviously could not present a retractor that did not exist. At that time, they were just doing what we have previously mentioned; they retracted the lung with a device that was neither created nor modified for that function. What these Indian colleagues used to keep the lung aside were myocardial stabilizers for coronary surgery, not “stabilizer retractors” as Rodríguez León *et al*¹ stated in their letter.

Finally, these authors¹ point out that Cunningham started an interesting argument a little over a decade ago in the pages of *Annals of Thoracic Surgery*, but what he really did in his brief letter¹² was to validate, with his experience, the results of another surgeon who has always advocated the benefits of skeletonization. It was not Cunningham who initiated the aforementioned controversy, which took place more than 40 years earlier, when in the early 1960s surgeons had to decide whether to continue skeletonizing the internal mammary artery, as Vineberg had taught, or to dissect it alongside with its pedicle as Sewell had begun to suggest.

In conclusion, we are grateful for the letter from Rodríguez León *et al*¹, because –although we do not agree with their point of view– it has given us the chance to explain our work again and conclude that: After a thorough literature review, where we analyzed more than three thousand scientific articles, published since the 1940s in the most prestigious journals of cardiology and cardiothoracic surgery in the world, we can still claim to have developed the first malleable lung retractor specifically designed to facilitate extrapleural dissection of the internal mammary artery.

CONFLICT OF INTERESTS

None declared.

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Comments apropos of the article "In-hospital cardiorespiratory arrest: a current challenge"

Comentarios a propósito del artículo «Paro cardiorrespiratorio hospitalario: un desafío en la actualidad»

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