well with the affected side. The accuracy of this predictive model will further undergo testing in our future Nuss removals. We agree with previous authors [6, 10] on that mechanical compression is the primary element that might explain the mechanism of IMA distortion. This compression possibly correlates with severity of the deformity. In 2 patients of the present series, both IMAs were unaffected despite an asymmetrical character of PE. This can be partially explained by the low placement of the bar, since the IMAs bifurcate after the fifth or sixth ICS and their diameters decrease. The harvested IMAs for coronary artery bypass grafting (CABG) are usually ligated at this point. Residing on this, some have suggested that Nuss bar placement lower than the fourth ICS should not endanger IMA usability by retaining sufficient IMA length. Moreover, these 2 patients have the lowest Haller index of the whole group (3.11 and 3.01). These 2 patients also showed the smallest change in the Haller index after removal of the bars (0.61 and 0.91, respectively). It is possible that a greater degree of change will imply a greater distortion or pressure caused by the bar increasing the risk of IMA obstruction. However, further investigation with a larger number of patients is needed to confirm these observations. It is, therefore, recommended that all patients undergoing CABG following the Nuss procedure undergo preoperative evaluation of IMA patency.

According to our results, it is difficult to correlate the risk of IMA distortion and the interval between application and removal of the bar. This is because of the small number of patients and the relatively narrow range of implantation period (31–44 months). In addition, all the post-removal CTAs were performed before discharge of the patients (on approximately postoperative day 5). For this reason, a follow-up CTA 1 year after bar removal is planned and will be addressed in the following report.

There has been a shift from digital subtraction angiography (DSA) towards multidetector CTA in the evaluation of vascular structures, like the IMAs [17]. The high invasive nature of DSA and the significantly improved CTA technology justifies this change. Structures with very small diameters are easily depicted and already used as prognostic values in risk stratification of CABG patients [18–20]. Even with a high coronary calcium burden, a known factor that can adversely affect image quality, CTA can exclude significant coronary artery disease [19]. Being a rapid imaging modality with accurate visualization of vessel anatomy, flow and patency, we used CTA as a reliable and non-invasive method in order to assess the IMAs [6, 19–21].

In conclusion, our preliminary data demonstrate that there is a unilateral obstruction or highly decreased flow pattern of the IMAs in 67% of the patients and the affected side corresponds well with our predictive model. Based on these results, we will extend our pilot for the next pending Nuss bar removals. Follow-up CTA will be performed for all patients 1 year after removal of the bar. Our Radiology department advised the use of MRI in future removals in order to limit the radiation exposure in this young population. We will also analyse the benefit of flow measurement.

Conflict of interest: none declared.

REFERENCES


eComment. Suggestions that may prevent internal mammary artery obstruction after thoracoscopic Nuss bar repair of pectus

Author: Sameh I Sarsar
Cardiothoracic Surgery, Mansoura University and KAMC, Makkah, Saudi Arabia
© The Author 2014. Published by Oxford University Press on behalf of the European Association for Cardio-Thoracic Surgery. All rights reserved.

I read with great interest the initial report by Külçü et al. about the patency of the internal mammary arteries (IMA) after removal of the Nuss bar [1]. I have a few comments. Firstly, was the interference with IMA patency associated with any clinical, biochemical or radiological evidence of myocardial ischemia? Secondly, IMA patency compromise could be due not only to the compressive force of the bar, but also to the relative shortening of the IMA after correction of the pectus excavatum, thus stretching the IMA.
Whatever the mechanism, I can suggest some things which may help to overcome this high percentage of unilateral total obstruction or highly decreased flow pattern (67%). My two suggestions are, firstly, that I found it useful to harvest the IMA 1 cm proximal and distal to the site of implantation of the Nuss bar, passing the bar between the sternum and the harvested piece of the IMA in view of the uncertainty about the future clinical impact of this IMA and iatrogenic obstruction. Thoracoscopic IMA harvesting from a single side is safe and reproducible and satisfactory length of both arteries can be obtained [2]. Secondly, it may be that a retrospective study of the cases who had Nuss repair could help to determine whether those patients had more significant myocardial ischaemic events or not.

Conflict of interest: none declared.

References


eComment. Nuss pectus excavatum repair: a hurdle for the treatment of coronary disease

Authors: Alain Wurtz, Ilir Hysi, Lotfi Benhamed, and Andre Vincentelli
Clinic of Cardiac and Thoracic Surgery, Lille University Teaching Hospital, CHU Lille, Lille, France
doi: 10.1093/icvts/ivu150
© The Author 2014. Published by Oxford University Press on behalf of the European Association for Cardio-Thoracic Surgery. All rights reserved.

We read with great interest the comments by Sameh I Sersar [1] on the recent article from Külcü and colleagues [2]. In 2013, Yüksel and colleagues reported a prospective study of the internal thoracic artery (ITA) blood flow after placement of a Nuss bar for the treatment of pectus excavatum, and clearly demonstrated that the blood flow of these arteries was affected in 44% of patients in the postoperative period [3]. However, the future of these anomalies was unknown. Külcü and colleagues reporting partial or total obstruction of the ITA in 67% of their patients after Nuss bar removal, provide a preliminary answer to the question [2]. These findings raise concern, since ITAs are widely used for coronary bypass grafting. Therefore, with a view to protect the ITA from compression/interruption for future potential use, Sersar suggests performing mobilization under thoracoscopic guidance at the level of the site of implantation of the Nuss bar and passing the bar between the undersurface of the thoracic wall and the mobilized ITA segment [1]. In fact, such Nuss bar placement might lead to adhesions to the surrounding structures, and consecutive ITA lesions at the time of the bar removal. These adhesions have already been described as the cause of severe or lethal cardiac haemorrhages [4]. Finally, we consider that the best prevention of such outcomes is correcting pectus excavatum by means of a less invasive simplified Ravitch-type technique [5].

Conflict of interest: none declared.

References


