

Atrioventricular Block after Cardiac Surgery

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COLUMN ARTICLE

Introduction

Atrioventricular block is the most common bradyarrhythmia that occurs after cardiac surgery and can involve the implantation of pacemaker. It's associated with a high morbi-mortality, the reason why it's important to study different factors that increase the risk of having an atrioventricular block, how to avoid it, and the best timing for pacemaker implantation.

Epidemiology

The incidence of atrioventricular block (AVB) after cardiac surgery depends on the type of surgery. The aortic valve replacement is the most implicated surgery with an incidence of 25%. AVB occurs in 8% for non-aortic valve surgery, and in 1 to 4 % overall [1].

Risk factors

The heart valve surgery seems to be a major risk for the occurrence of an AVB, especially the surgery of the aortic valve. This increased risk could be explained by the prox-

imity to the conduction's ways. Furthermore, older age, female sex and endocarditis were also described as risk factors for the development of an AVB [2]. Sutureless aortic valve replacement was also reported with a higher risk of AVB than other type of aortic valve surgery [2]. The risk is also increased with the presence of a bicuspid aortic valve, annular calcification and annular abscess.

The peri-procedural myocardial ischemia and the duration of the extra-corporal circulation are also related to a higher risk of development of AVB after surgery [3]. In the same field, the peri-procedural use of sotalol or amiodarone is associated with a longest cardiac bypass time, and lead to a higher risk of AVB. In addition, the hypothermia used systematically during the procedure is also associated with ischemia and AVB. Deepest hypothermia is directly associated with conduction tissue damage [4]. Batra AS., *et al.* have also reported that the presence of right or left bundle brunch block was associated with increased risk of conduction disorder and implantation of a pacemaker after surgery [5].

A significant correlation has been demonstrated between the occurrence of conductive disorders, including

AVB and the type of congenital heart disease operated, this is true for three types of interventions: ventricular septal defect (VSD), tetralogy of Fallot, atrioventricular canal [5].

Other congenital heart diseases can also cause conductive disorders, especially surgical corrections of the transposition of the great arteries or palliative surgery for tricuspid atresia or Fontan intervention.

It has been reported that trisomy 21 patients operated for congenital heart disease are more likely to develop postoperative conductive disorders than other patients undergoing surgery. The anatomical relationship between conduction abnormalities during trisomy 21 and the conduction system during peri-membranous ventricular septal defect was described, but no favorable factor has yet been retained in the literature [6].

Tucker, *et al.* concluded in the same series that trisomy patients operated for a peri-membranous VSD are younger age and had lighter weight compared to patients operated for the same pathology not presenting trisomy 21, but it does not explain the high incidence of BAV during this series [6]. According to the authors, this suggests that there is another Trisomy 21-related factor explaining this incidence. In the literature no study has yet been done.

Atrioventricular block and pacemaker

Regarding the pacemaker implantation time, the ideal moment has so far been a subject of controversy. In the series of Ben Ameer, *et al.* the final pacemaker implantations were performed on average 31.8 days after the intervention (8 - 128 days) [7].

It is legitimate to consider that in case of important factors, particularly when it comes to aortic surgery with high chances of having damaged the beam of His and when the disorders appear immediately and last beyond 48 hours, that the deadlines can be shortened.

The postoperative BAV 2nd and 3rd degree unsolved or persistent beyond 7 days is a class I indication of pacemaker implantation and there is no indication for the establish-

ment of the pacemaker in patients who had a return to normal AV conduction [8].

Some authors support the idea of earlier implantation. Hancock, *et al.* have proposed that the presence of a complete AVB for 3 days in the postoperative is a reasonable indication for pacemaker [9].

Kim, *et al.* proposed in a series of 155 patients operated for valvular heart disease, that the time to definitively implant a pacemaker in patients with complete AVB within 24 hours after surgery and persist for more than 48 hours should not exceed seven days [10].

In the light of these data, some authors suggested early implantation by the end of the first postoperative week when the conductive disorder persists and is associated with predictive factors.

CONCLUSION

Conductive postoperative disorders represent serious and severe complication compromising the prognosis of the disease and sometimes leading to the implantation of a definitive pacemaker. Several factors have been reported in the literature, related essentially to the anatomical attack of the conduction system or by direct involvement of the artery of the atrioventricular node of the coronary network or by time of aortic clamping of elongated extracorporeal circulation or deep hypothermia. The timing for the implantation of the definitive pacemaker after surgery is two to three weeks but these delays are controversial and some authors suggest earlier implantations in certain risk situations.

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