

Surgical Ablation for Atrial Fibrillation: Breaking the bank or worth every penny?

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Chow et al (1) report that significant financial resources are spent on surgical AF ablation in Canada with unclear long-term benefits and “scientifically rigorous” data regarding reduction in mortality and stroke risks. The authors call for large prospective studies examining clinically important outcomes to justify the routine use of concomitant surgical AF ablation (SA) and to guide allocation of healthcare funds. Based on their analysis, they assert that concomitant surgical AF ablation during cardiac surgery should be reconsidered. To better put these findings into context, it is important to examine the assumptions made and data utilized to assess both cost and benefit.

The authors admit that their methods for cost derivation are significantly limited and do not “constitute the precision of a detailed prospective cost-utility analysis.” However, even their “simple methods” are incomplete and miss important alternative costs if SA is abandoned. They describe the incremental costs associated with surgical ablation of AF in a specific geographic location - Ontario (Canada). The authors aggregate costs from a variety of sources but base much of their calculations on an increased hospital length of stay (LOS) and increased pacemaker implantation rate from a recent systematic review and meta-analysis of RCTs of surgical ablation of AF (2). This systematic review describes an increased hospital LOS of ~ 1.67 days and a trend (not statistically significant) of increased permanent pacemaker implantation at hospital discharge, although risk of pacemaker implantation was not increased in the long term. Using this information plus Ontario-specific information of institutional costs, physician remuneration and device costs, they generate Ontario-specific financial costs for the procedure and calculate the incremental cost associated with this intervention as \$4287 CAD per patient. The authors state that their calculations likely underestimate the true cost of surgical AF ablation but that at least over \$10 million (CAD) was spent in Ontario province on surgical AF ablation between 2006-2017. The authors fail to consider, however, the alternative costs associated with NOT performing SA in patients with AF undergoing surgery. While surgery for the primary structural abnormality may alleviate the patients’ symptoms, it is likely that patients with pre-existing AF will continue to have AF if SA is not performed. Patients whose AF is left untreated could continue to have symptoms related to AF necessitating multiple procedures, including cardioversions, hospitalization for initiation of antiarrhythmic drugs, and catheter ablation. Even patients with asymptomatic to minimally symptomatic AF are often treated with this multiplex of therapies, each of which has more limited efficacy than SA. Given the likelihood of multiple treatments and procedures if SA is not performed, any clinically relevant cost analysis must incorporate this real cost. Consequently, the true incremental cost of SA is likely substantially less than the numbers generated by Chow et al.

When analyzing the benefits of SA, the conclusions draw heavily from a recent systematic review and meta-analysis that describes several key points regarding surgical AF ablation: 1) surgical AF ablation during cardiac surgery improved freedom from AF at 12 months; 2) there was no statistically significant evidence of impact on mortality, thromboembolic or neurovascular events with limited long-term follow-up; and 3) the evidence for improvement in health-related quality of life was limited (2). It is important to note that of the 23 studies in this meta-analysis, only 5 had follow-up >12 months and only 1 > 24 months. This reported

time frame may be inadequate to detect significant differences in clinical outcomes, particularly long-term outcomes such as incident stroke and mortality.

As a comparison, in the world of catheter-based ablation, we have recently had the results of the CABANA trial (3). In the intention-to-treat analysis, this trial did not demonstrate statistically significant differences between catheter ablation and anti-arrhythmic drug therapy with regard to the primary composite endpoint of death, disabling stroke, serious bleeding, or cardiac arrest. However, there was a substantial and clinically important benefit of catheter ablation over drug therapy in reducing recurrent symptomatic and asymptomatic AF over 5 years of follow-up (4). There were also clinically important and significant improvements in quality of life (QOL) at 12 months in symptomatic patients (5). There was also a signal for decreased cardiovascular hospitalizations, although not centrally adjudicated, and there may be a signal for mortality benefit of catheter ablation in the subgroup of patients with systolic dysfunction (6). On-treatment analysis showed even more significant benefits, even with mortality reduction.

Currently, the American Heart Association and the European Society of Cardiology provide a Class IIa recommendation for concomitant surgical AF ablation to maintain sinus rhythm in symptomatic patients. The guidelines consider surgical AF ablation with cardiac surgery a “reasonable” treatment, including patients with persistent or permanent AF (7, 8). The recent 2017 STS guidelines outline that concomitant surgical ablation to restore normal sinus rhythm during mitral valve procedures is a Class 1 recommendation, level of evidence A. Similarly, surgical ablation at the time of isolated AVR and AVR with CABG is a Class 1 recommendation, level of evidence B-NR (9).

We believe the authors’ suggestion that the incremental cost of surgical AF ablation, based on this incomplete analysis, is too great to be shouldered by the taxpayers of Canada is unjustified. This manuscript touches on some interesting topics regarding the rendering of medical care, namely – what patient outcomes justify the financial costs of a procedure and what bar do we set for the level of evidence needed to justify the performance of a procedure but their cost-benefit analysis is incomplete requiring careful reevaluation of its conclusions.

The importance of freedom from AF and protection from AF relapses for patients, in particular those with symptomatic AF, cannot be underestimated. Both catheter ablation studies such as CABANA and studies of surgical ablation support a clear decrease in AF burden with ablation. In CABANA, freedom from AF was long-lasting with the benefit of ablation sustained, although attenuated, at 5-year follow-up. Interestingly, the CABANA trial also included patients who had MI, PCI, or valve/bypass surgery > 3 months prior to enrollment although we do not have subgroup-specific data. In regard to freedom from AF, the surgical ablation data from the referenced meta-analysis only extends on average to 12 months (2), but we cannot exclude the possibility of a more sustained treatment effect like that seen in CABANA. In a study of SA, risk-adjusted survival differences were assessed in 372 propensity matched pairs; at last follow-up, 78% of SA patients were free of AF, and restoration of sinus rhythm was associated with improved survival (10). While large-scale data on mortality following SA remain sparse, the Society of Thoracic Surgeons’ report of over 28,000 propensity score matched patients with and without SA support improved survival at 30 days (11).

There is strong evidence for improved symptoms and quality of life in patients after ablation. In the DISCERN AF study which evaluated symptomatic and asymptomatic episodes of AF pre and post radiofrequency ablation using long-term continuous monitoring, rates of symptomatic AF approached 50% (12). After ablation, arrhythmia events were 3 times more likely to be asymptomatic and the proportion of asymptomatic episodes approached 80%. This was also substantiated by CABANA trial data that showed that when AF recurred after catheter ablation it was more likely to be asymptomatic – at five years, freedom from recurrence of *symptomatic* AF episodes was ~ 80% (4). Health-related quality of life was also significantly improved at 12 months in the ablation group versus medical therapy (5). In the systematic review from McClure et al, there was a significant difference in physical role functioning post-operatively even though there were only two studies that could be included in the analysis (2). Granted, in patients undergoing cardiac surgery, health-related QOL outcomes are confounded by improvements in treating the

underlying heart disease in addition to the restoration of sinus rhythm (13).

Overall, the relatively small cost of \$4287 CAD per patient, which would represent a much smaller incremental cost when accounting for the subsequent cost for AF treatment if SA is not performed, strongly supports undertaking this procedure despite the small increased risk of pacemaker implantation and increased hospital stay given the known and established benefits of freedom from AF and improvement in symptoms and quality of life. Additionally, the use of this procedure should not be halted since there is short-term and mid-term surgical mortality data that support its use (9-11), and we cannot rule out mortality and stroke benefit over a period of 5 or more years because of the limited data available. In this sense, we agree with the authors that updated long-term outcomes should be pursued to enhance our understanding and to refine decision making.

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