Review

Ambulatory cardiac surgery

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Summary

In order to move toward a program of reliable and routine ambulatory cardiac surgery there must be a paradigm change in the attitude of both patients and caregivers. The status quo must be abandoned and replaced by the pioneering attitude of the early practitioners who formed our specialty.

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1. Current practice

As coronary artery bypass operations became firmly established in the mid 1980s, the average length of stay following surgery was 10-11 days [1,2]. By 1993 data analysis by the Society of Thoracic Surgeons Adult Cardiac Surgery Database revealed a mean post-procedure length of stay for isolated coronary artery bypass procedures of 8.5 days. Although this had decreased to 7.0 days by 1997, the average post-procedure length of stay has remained relatively unchanged since then even in light of the development of new techniques and technologies[3].

There are, however, isolated reports of shortening post-operative lengths of stay with the use of 'fast-tracking' and the application of techniques such as off-pump coronary artery bypass (OPCAB). Ott and colleagues, for example, reported in 1997 the use of a 'rapid recovery' protocol which allowed 29% of the patients in their series to be discharged within 3 days [4]. In addition, Puskas, et al. reported that they were able to decrease the average post-operative length of stay from 5.7 days in patients undergoing arrested heart coronary artery bypass to 3.9 days by using OPCAB techniques [5]. Furthermore, through the routine use of OPCAB and the application of 'fast track' protocols, we have recently reported the ability to discharge 56% of patients on the first post-operative day [6]. However, despite these reports, the average post-procedure length of stay reported by the STS data base remains about 7 days.

2. Drivers for change

In the United States, as in most other countries, the cost of healthcare is rising and reimbursements to providers and facilities are falling. In a retrospective review of hospital costs by day for DRG 109 (coronary artery bypass without cardiac catheterization) we found an average cost to the hospital of $1491.61 per day. However, the cost differential from day one to day two was $1768.40 and from day two to day three was $1859.80. With the aging population and the resultant increasing need for cardiac services, one can appreciate how the ability to decrease hospital length of stay may have a significant financial impact. Basically, there is the necessity to provide improved outcomes while decreasing costs.

Another driver for change is competition. This includes the competition among surgeons as well as the threat of loss of market share to other facilities as well as other specialties. There may indeed come a day when the most talented of healthcare providers, if not cost conscious, may have their privileges restricted if the manner in which they provide care results in continued financial losses for the facility or healthcare system. It is imperative that the providers, who impact as much as 80% of healthcare costs, become intimately involved not only in the quality of outcomes, but in the costs of care.
3. Options for progress

“There are risks and costs of such a course of action, but they are far less than the long range risks and costs of comfortable inaction.”

John F. Kennedy

There are several options by which to proceed. Many may choose to refuse to change and maintain the status quo. This is in reality nothing more than the fear of change and amounts to a response of ‘comfortable inaction’.

However, one positive manner by which to respond to this need for change is to analyze the number of processes currently in place regarding the pre-operative, intra-operative and post-operative care of the cardiac patient and modify them as new technologies and techniques allow. For example, many of those who embrace the use of OPCAB have not changed the way in which they care for these patients post-operatively. The change in technique has not been fully exploited by a modification of the entire process.

Another option for progress is the sharing of ideas, techniques and processes through educational programs such as this Symposium for the Future. Of course, this requires careful data collection and proper analysis in order to determine whether changes which are instituted have a positive or negative impact. Through the sharing of ideas and results we can learn from one another’s successes as well as failures.

Finally, designating ‘centers of excellence’ with accepted criteria developed by our professional organizations such as the Society of Thoracic Surgeons, the American Association for Thoracic Surgery and the European Association for Cardio-thoracic Surgery could be used to provide sites where visiting surgeons could observe such ‘best practices’. These centers could also provide structured continuing medical educational programs regarding the application of new techniques which may further help to drive changes in practice.

4. Key issues

Obviously, the key issue surrounding the possibility of ambulatory cardiac surgery is safety. As with any change in practice, the change must first be based on sound reasoning and data must be collected in order to show both safety and efficacy. The most important questions to consider regarding ambulatory cardiac surgery are out of hospital events such as post-operative atrial fibrillation, neurologic events and cardiac events. Secondarily, the need for emergency department visits and re-admission rates and causes must be evaluated. Careful data collection and analysis such as this will allow an evaluation of the true safety and value, that is, cost for benefit, of ambulatory cardiac surgery.

Through the application of techniques and processes that prepare the patient for early discharge, allowing for routine operating room extubation and providing adequate pain relief it is possible to reliably and safely discharge patients to home on the first post-operative day. The key issues remain that of safety, patient acceptance and physician attitude toward change.

References


Appendix. Conference discussion

Professor T. Treasure (London, UK): Thanks, Randy (Randolph Bolton). We have been sitting next to each other all day sharing comments, so it was great to hear your talk. I think this is wonderful, and I think it is the right attitude of mind to set the patient’s and the doctor’s expectations from the outset. I admire what you do enormously, and although it does surprise me, I can see it is possible.

In thoracic surgery, one of the things that has happened is because we use VATS, the expectations of long stays have gone away. More than 20 years ago when I joined a senior colleague in cardiac surgical practice, his custom was to have the patients in three to five days before surgery, to do final tests and so forth, and a fortnight was the minimum stay, as a policy. When I arrived we had the same number of beds and we increased through-put by more than three times within a couple of years. So we had to move the patients through more quickly. He was a good colleague, and he accepted that admission the day, with pre-admission clinics, and a week’s stay afterward was long enough.

In thoracic surgery, we are now sending out lobectomies and pneumonectomies very early. My earliest was 48 hours after pneumonectomy. The patient wanted to go sooner but the nurses just simply couldn’t face a pneumonectomy going out the next day. Three and four days have become common. So I operate on Tuesday, which is typically my major lung resection day, and the target is out by the weekend, or at the weekend, and we do it, and we do it because before they ever come in, we set that as the target: we are expecting you to be out at the weekend. So I think a huge amount is how you plan the anesthesia, how you set the patient up, what their expectations are, and of course, making no mistakes, because once you have complications you have to revise the early discharge plan.

That was a great talk. Thank you very much.

Dr Bolton: I think you are exactly right. One of the things we really had to do was overcome what patients expect, as well as what the referring doctors expect. Now, luckily when I started doing this, I was in a clinic situation where my referring doctors didn’t have a whole lot of choice, but then it got to be, especially from the elder cardiologists, we are going to send him for ‘your operation, because I was the one doing the off-pump surgery, and so, you know, anybody over 85 or had a bad heart, they kind of started pushing them that way, and that was fine, that was well and good, because I really enjoyed it, but changing the attitude took a little bit of time.

Changing the attitude of the patients, I guess the best point to that is I have a good friend, we have been working together for a number of years in
Kiev, and when I first went over to teach some techniques there, the average length of stay was 11 days, now it is 6, and Dr Rudenko has built a wonderful program, decreased his mortalities and all because he’s a phenomenal surgeon and teacher. But the point is he has got the patients indoctrinated to understand that we don’t stay 11 days anymore. Now, he is not sending them home the next day, but maybe that will come with time.

Dr C. Mestres (Barcelona, Spain): When I went through your abstract I was really surprised and willing just to have a look at this presentation. So I think we have to congratulate you because of this idea. In our place we have been struggling for many years just to keep the admission down, and I think we succeeded. Now it should be a little less, below a week or so, for many reasons. I am not sure if we can compare the systems between your place and my place, that could be the number one factor, if it is a private patient or if it is in a social security system like mine or so.

But I would like for you to make very clear for me a couple of things, and I will tell you why. Because some years ago I was talking to a very good friend of mine from the East Coast of the United States in the state of Pennsylvania, to say something, I am not going to tell you the place, and I found that they were able to send the patients, even with a ventilator, to a nursing home, and this is technically discharged on the second day. So please make it very clear for me if what you refer to as ‘early discharge’ means going home, number one? Technically discharged on the second day. So please make it very clear for me.

Dr Bolton: To make this perfectly clear, this means going home to their family and sleeping in their bed that night, breathing on their own and waking up the next day, breathing on their own and waking up in the morning and going to their bathroom.

Dr Mestres: That is okay. No, no, I need an exact translation of that.

Dr Bolton: I think it’s a good question, and it depends on the system.

Dr Mestres: It is a key point, and I think the major differences between health systems may take into account that.

So number two, what about your own experience? Because the fear we have, and it is the only one that still prevents myself from sending our patients home, is atrial fibrillation, and the costs of readmission and to have some silly guys putting on warfarin and kind of things like that, considering that 90% of those episodes are going to be back in normal sinus rhythm maybe in a week or so. So I would like you to stress from your own experience of that, not only infection and so on, because whatever happens is some morbidity. And I can recall the elegant study by Torkel Aberg years ago showing that in a very well controlled place like Umeå, 40% of the patients got at least one complication in the post-op period. So I mean, that is the point.

And finally, have you had any experience with surgery in the awake patient?

Dr Bolton: Let me answer that one first. The answer is no, I don’t see why to do it, not if I can exubate the patient at the end of the operation, control all the hemodynamics. I don’t want to talk to the patient during the surgery, and I prefer they not talk to me. They may not like the music I play, and I would rather them be asleep, and then it’s a controlled situation no matter what. That is the answer for me, they all go to sleep.

Back to the A-fib, that is always the question I get, and I made a comment about this before, I say, I don’t see it. Well, it is because they are at home. I don’t for one minute think that we have a zero incidence of atrial fibrillation. In the patients that I have done off-pump surgery on that have stayed in the hospital or have had an in-hospital event of atrial fibrillation, that comes out to about 13%. I have had three patients since 1999 come back to the hospital in A-fib. One came back early because he was feeling badly, we found he was in A-fib, another came back at his clinic appointment and was found to be in A-fib, and another one went into A-fib at 28 days postop. So I wouldn’t have picked him up anyway if I had kept him a week.

The other half of that, though, is we have not had any complication in a fairly closed system, and I have almost a 100% follow-up—I have to say ‘almost’ because I can’t give you all the numbers off the top of my head—that shows that we have not had a complication related to the A-fib other than the A-fib itself.

Now, I am going to go out on a limb here and I will tell you, believe we’re dealing with a different animal than chronic A-fib. I think postoperative A-fib is tremendously something that we have not studied in its entirety, and we were talking a little bit about this earlier, but I believe these people have atrial fibrillation at home, and then they cough, sneeze, strain at stool or do some. So that breaks the A-fib, but in the patients that were not in atrial fibrillation before they went to the operating room, first off, I didn’t send any home in atrial fibrillation; if they had an event in the hospital we converted them and that sort of thing.

The only postoperative medications that routinely they go home on is an aspirin, a beta blocker, and pain relief. Now, if there are other indications, they get other things. For a while I was frightened about the possibilities and I decided to maybe do Plavix. Well, there is no evidence to show that Plavix, number one, increases the short, long or intermediate term patency, and number two, I had no data to support the decrease in thromboembolic events after atrial fibrillation. So based on my own belief in evidence-based medicine, I said, why am I doing this? Oh, by the way, it increased the number of pleural effusions I had to drain, so I quit doing that.

Dr T. Aberg (Umeå, Sweden): Are the patients being given any nursing support during the days after going home and are they regularly scheduled for an outpatient visit? The other thing I would like to do is commend you to have tried this. I do support you on the incremental change. We can all do this by having a good policy trying to have a distant goal. In this case it is a very measurable goal of reducing the visit in the hospital.

We have now heard two outstanding presentations showing that it is possible to rationalize the coronary artery surgery bypass operation. Are we as a profession ready to adopt this new knowledge?

Dr Bolton: To answer the question about the nurses, it is selective: only patients that we feel need it will go home. Off the top of my head, I would say that would be less than 20% of that cohort of patients that go home.

One of the reasons, by the way, of having the family in the room so quickly, this gets to the process analysis. Instead of having a family come in a few days after the surgery, we have minutes and hours, and then they all go to sleep, and I prefer they not talk to me. They may not like the music I play, and I don’t want to talk to the patient during the surgery, and all the hemodynamics. I don’t want to talk to the patient during the surgery, and they all go to sleep.

Dr M. Turina (Zurich, Switzerland): Fascinating talk, Randy. For your statistics, you can add Antonio Calafiore, who had observed the patients after his LAST procedure going home in the evening after the operation. So he demonstrated a truly ambulatory CABG. But there is obviously much more in this technique than you told us. It is not only the perfect surgical technique, but there are many details in anesthesia and postoperative pain management. For instance, how do you prevent cooling of the patient? That defeats my attempts at early intubation. Even if I take both internal mammarys down medially, somebody else takes the vein or radial artery, the patient will be at 35 degrees by the time the operation is finished, and cannot be extubated. He is shivering; the whole operating table is shaking.

Dr Bolton: You are not going to like my answer. I don’t do anything special, although I had a junior partner, who is a little bit slower than I am and took a little bit longer, he was learning the techniques, and we used a warming jacket for his patients to help keep them warm. What we have done actually is very simple, again, trying to stay simple, we take a huggler device and blow it on the head of the patient, not up his ear, we are not going to burn him or anything; I know all the studies and the concern about that. It is covered and I am well away. I know there are some things to be concerned about that. What is that we do. We also have tried using a warming blanket on the bed.

I don’t keep the room hot. I stay comfortable. We found that our patients come out about—and here is an interesting statistic. The question would be, how cold are your patients when you actually cut their chest? Because we looked at our cooling, what happened, and by the time they get a liter or two of cold crystalloid and get intubated, and then they have been disorbed for a period of time, and then they get painted with something that is going to evaporate, it turns out that the average drop in temperature from the time I cut the chest until the time I close the chest was less than one degree C. We found that the predominance of our temperature drop was earlier.

We started using fluid warmers, and we don’t do anything to the patient until we have tried this. I do support you on the incremental change. We all can do this by having a good policy trying to have a distant goal. In this case it is a very measurable goal of reducing the visit in the hospital.

We have now heard two outstanding presentations showing that it is possible to rationalize the coronary artery surgery bypass operation. Are we as a profession ready to adopt this new knowledge?
A lot of people, I know Dr Mack does this, keep the room warm. I don’t know that there is any proof to show that the increase in ambient temperature of the room by 5 or 10 degrees is going to make a lot of difference when the body is predominantly covered except for the head, and the open chest, of course.

So that, yes, sir, I think it’s a concern, but by using some fluid warmers and then just, whatever, dealing with your staff, dealing with the ideas. The ideas that I get mainly come from our nursing. They say, why don’t we do this, why don’t we do that? I use warm saline when I wet my hands; the nurses keep it in the warmer. I use warm saline; anything that goes on the heart, it is warm. So we are very careful to try to do all the little things. I am not sure how much it contributes, but maybe it is just enough.

Dr A. Kappetein (Rotterdam, Netherlands): The Expedition Trial included 6,000 patients. The results still have to be published. It comprised a slightly higher risk population, three-vessel disease, left main, over 70 years of age, but it included patients from many European countries and the United States and Canada. The hospital mortality was around 1.5% and surprisingly the mortality at six months was 6%.

So the question is, what happens between discharge of hospital and six months? So 1 out of 20 patients die during follow-up, and that surprised me and that also worries us. What happens if patients are discharged very early? Perhaps you have an answer to that.

Dr Bolton: I can only give you my anecdotal data. In that last paper, Dr Baisden was the one who published the data, acutally, I think it is six-month data that he got in there. Normally, what I have done is do the same thing that we do with the STS database for the 30 days, because then I think, like most surgeons, we start to have a dropoff, unless we have a very good scientific research department that can help us. I don’t have time to follow-up on all that data. For a long time I was keeping my own data, but now it kind of gets too busy to do that, and we do need that data.

I don’t know the answer. I can only say anecdotally, being in a small town where I was for the last two years, my nurses would check the obituaries every day, and we found that there were two or three patients that had died over the course of a year, but then you get into the stratifications of how bad was their heart to start with, what was the indication here or there, what comorbidities were there.

I think we have to look at the bottom line. We have to look at every single patient, because that is who we operate on, and giving the excuse of, well, this patient had a bad heart, we still operated on them, and on the Internet, that is what is going to be out there, and that was the best thing for that patient, even if they had a 35% predicted mortality.

Dr Kappetein: I agree with that, but the hospital mortality is quite low, only 1.5%, and it is a six-month mortality of 6%. So something happens with these patients, and I wonder if patients are discharged too early, and perhaps you should keep the patient a little bit longer in your hospital to see the complications during the hospital stay.

Dr Bolton: Well, if that’s the case, then I would have known in 30 days. I do keep that data. What I am concerned about, personally my goal now is to find out the true incidence of atrial fibrillation out of the hospital, maybe by using a loop recorder, some way to track that data, not just short term but that six-month, year, 18-month data to say, okay, we did a four-vessel coronary but at month eight they had a dysrhythmia and that was what they succumbed to, or maybe not. It may be that we have treated A-fib. We still don’t know when you send them home on day seven that they didn’t have three or four more instances of A-fib over the next two months. So we just lack the data for me to speak intelligently on that other than to say we don’t have it.

Dr L. Bockeria (Moscow, Russia): I wanted to say just a few words concerning this session. We started with questions about and will continue the problem of the future of cardiac surgery. We did not touch on pediatric surgery, and this is a very wide problem.

I participated two weeks ago at Cardiostim in Nice. You know, that is the biannual meeting. There was a session devoted to fetal cardiology, and a presentation named Fetal Cardiology: New Horizons or End of Pediatric Cardiology by M. Guariguia from Paris. I went to the session just to listen what that means. It was a very serious discussion. Participants were mostly from UK and France.

They said, for example, that according to the regulations in UK, pregnancy with hypoplastic left heart syndrome should be aborted. Participants were considering several more complex congenital heart diseases which probably will be aborted in the UK in the near future, for example AV canal. And even tetralogy of Fallot was also discussed for early abortion. There were serious discussions. I am telling just what I heard. The topic was supported strongly by colleagues.

So, what was the conclusion, why pediatric cardiology might die. Because in such a case there will be only simple congenital heart diseases, and this means that pediatric cardiac surgery will also go somewhere down. I just wanted to inform you about thoughts which are rotating among pediatric cardiologists. That also probably will be a new topic for further discussions, and I thank you from my side.