My CABG Heart Operation
March 13, 2014

Introduction

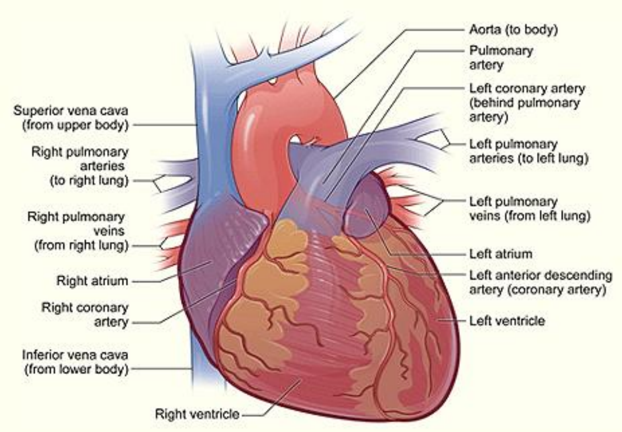
I wrote this as a detailed description of how I came to be diagnosed and have an open heart double bypass in the spring of 2014. It was a complete surprise that the procedure was necessary - no symptoms, no chest pains, no shortness of breath - no nothing. There was only 2 months from the initial diagnosis to chest cutting time and things moved very fast. All of the doctors were new to me and there wasn't really much choice or time for choice. Fortunately, I was very lucky in getting top notch people all the way around.

Now, in mid July about four months after the surgery, I have to say that the entire experience from start to finish was handled extremely well and has been, so far, a total success. About the only way it could have gone better was not to have gone at all.

This little paper is to explain what went into a successful process from start to finish and what people facing similar circumstances can expect from a lay standpoint. From a sample of one, this is how things *should* go[1].

If you ever have heart problems that are leading toward bypass surgery, hopefully this will give you an idea of what to expect in general even when things go right and some idea of what questions to ask your physician and surgeon before the procedure. It's serious but bypasses are almost routine now – especially if the underlying problem is diagnosed *before* a heart attack occurs.

Heart 101



For those of you who have forgotten your High School biology, the human heart is a 4-chambered organ that runs like a two-cycle engine. During the interim between cycles, the upper chambers of the heart (atria) fill with blood - the right atrium with oxygen depleted blood from the body and the left atrium with oxygen-rich blood from the lungs. The lower chambers (Ventricles) are empty at this time.

The heartbeat cycle begins with an electrical pulse that causes the upper right and left atria to contract and pump the blood they contain into the corresponding and much larger lower right and left ventricles. It continues with the ventricles contracting in a controlled way to pump blood into the lungs (right ventricle) or body (left ventricle). This frequency and timing of the electrical pulse is generated by a bundle of nerves in the heart itself, but can be influenced by external and internal factors such as fear, age, excitement, exercise, drugs, blood oxygen level, etc. The blood pressure from the right side into the lungs is much lower than the blood pressure from the left side into the body, maybe as much as 1/3. It is the high pressure left side that is measured in the 126/72 type reading that you get in the doctor's office. There are usually more problems with the left side since it is a higher pressure pump.

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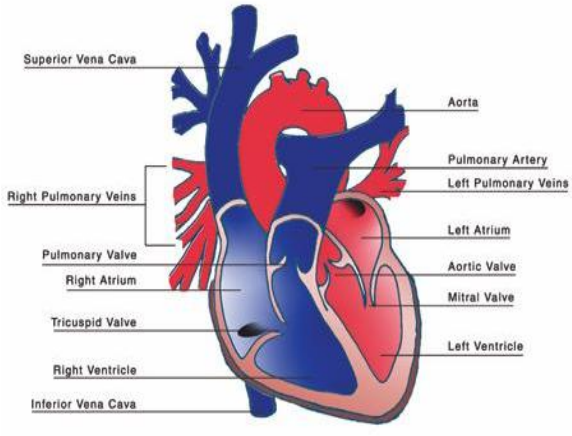
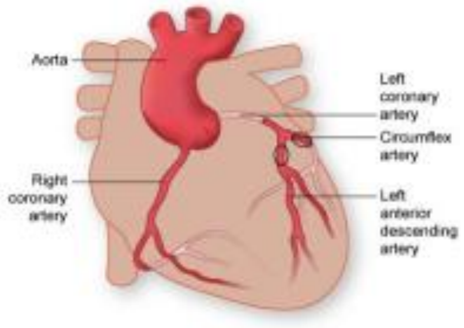
[1] There are *lots* of good articles and studies regarding this subject on the internet. There is also a lot of trash and biased reporting so stick to reliable sources and not personal opinions or rants. I've included some links that I found useful. Before surgery, arm yourself with a little knowledge of what's going on and discuss it with your cardiologist and surgeon. Remember that they *work for you* and that you are hiring experts. As such, you should heed their advice – but not blindly.



The lub-DUB sound heard in a stethoscope or felt in the pulse is actually the valves that control the blood flow in the heart slamming shut. The lub sound is caused when the ventricles begin to contract, forcing the tricuspid and mitral (bicuspid) valves between the atria and their corresponding ventricles to slam shut and thereby prevent backflow of blood from the right and left ventricles into the corresponding atria. The DUB sound is caused by the end of the ventricle contraction when two other valves (pulmonary and aortic) slam shut to prevent backflow of blood from the lungs and body into the right and left ventricles respectively. At this point the ventricles will begin to relax so that they can be refilled with blood by contraction of the atria. Over the lifetime of an 80 year old man, this will repeat approximately 3 billion times.

Powering all of this requires a lot of oxygen and the blood supply to the heart is fed directly from the aorta, getting freshly oxygenated blood before almost any other part of the body.

There are two main arteries, one for the right side and one for the left, both of which come directly off of the aorta and split many times into smaller and smaller blood vessels. In my case, the problem was the two black ovals in the diagram to the right.



Now, back to me.

Background

In the mid 80's when I was 45 or so, I had my first electrocardiogram (ECG or EKG - both the same thing) as a result of a routine physical because my then-doctor (Doctor B) thought he heard some sort of arrhythmia. He came back looking at the little strip of paper saying "*Well, I was right. This not normal, but it is not abnormal either. You have PreVentricular Contractions (PVCs) and if you were 65 and we first saw this, it would be cause for concern. But you have no symptoms and aren't in any of the risk-factor groups (drug user, alcoholic, diabetic, smoker, obese). And many people have these all their lives with no problems. It simply means that the heart misfires every now and then.*"

PVCs[2]

More technically, the lower chambers (Ventricles) of the heart beat too soon and disrupt the normal rhythm. The abnormal pattern is a normal beat, an extra beat (the PVC), a slight pause, then a stronger than normal beat because more blood filled the heart than normal during the pause. Theoretically, I should have been able to feel this but I couldn't - probably because I'd had it all my life and it was just part of me. If it happens too often, symptoms can be reported as "palpitations", dizziness or shortness of breath. I had none of these that I was aware of.

The cause is apparently irritation of the heart of some sort, but for the occasional occurrence it's often undiagnosed. Or it can be caused by too much caffeine, some medications, alcohol or a host of other internal or external reasons.

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[2] http://my.clevelandclinic.org/heart/disorders/electric/premature-ventricular-contractions.aspx

> One 2013 military study showed PVC occurrences of 0.5% (~3/minute) in under age 20 patients and 2.2% (about 13/minute) in patients over 50. This was deemed the 'normal' baseline by that study.

About 2004, while getting an exam for an insurance policy, the examining doctor raised the issue of PVCs, but after seeing I'd had them for 20 years or so, deemed it OK to issue the policy.

Another new doctor in 2009 ordered a MRI stress test that came back 'normal' except for the PVCs. Nobody mentioned them or apparently even thought them abnormal.

Fast Forward to 2014 - Diagnosis

In December of 2013 (now age 66) I changed doctors for insurance reasons and my new doctor (Doctor S) didn't like what she heard while listening to my chest. I explained (as I had for every other new doctor over the years) that I was aware of the PVCs and still couldn't tell that I was having them.

She ran an EKG (5-lead version) which showed a higher PVC rate than she liked. So she referred me to a cardiologist (Doctor J). A week later, Doctor J hooked me up to a 12-lead EKG to really see what was going on. As a result of that test, she had me wear what is called a Holter Monitor for 24 hours on January 7th. This thing is a 5-lead EKG recorder about the size of a pack of cigarettes. When the results of the previous 24 hours were analyzed, it showed 28% PVCs - *way* the heck too many by any measure of diagnosis. But still no symptoms - probably because very few of them were back-to-back - so-called doublets or triplets. But there were indeed *some* triplets (three in a row) and that is a threshold for a Cardiac Artery Disease (CAD) diagnosis. But while the monitor showed several instances of three in a row I still had no external symptoms noticeable by me. She mentioned 30 in a row in some people so my case wasn't the worst it could be. Still, where it is too frequent, there can be a risk of Ventricular Fibrillation where the heart basically just quivers and doesn't pump at all. The most likely cause for the high level of PVCs was coronary artery blockage. So she ordered a stress test and echocardiogram which was her specialty.

Doctor J scheduled me for a stress Echocardiogram[3] test the following week (January 16). This test uses an ultrasound (just like a pregnancy ultrasound) to image the heart under a non-stress condition (e.g. as it is when you walk in the door) as a baseline. They make a video of it for future reference.

Then you're hooked up to an EKG monitor and run on a treadmill till you can't run any more and they do the ultrasound thing again. As I was running, I could watch the monitor and see the PVC rate increase. Sort of scary.

The post-stress-test showed that the left ventricle was contracting only about 75% of what it was during the pre-stress-test indicating that it wasn't getting enough oxygen and therefore (probably) indicating some sort of blockage in the cardiac arteries.

She told me that she'd call to schedule an angiogram for me the next week that would show where the blockage was located and that a stent could likely be placed at the same time as an outpatient procedure.

Three days later, while I was still reading up on stuff and thinking about options, the catheter lab called up and the angiogram guy, Doctor Q, told me that I was scheduled in two days. That's when I called a Time Out, cancelled the procedure and told them I would be looking into a 2nd opinion. Things were moving way too fast. I rescheduled it for February 4th.

I made an appointment with Dr. B, who had originally diagnosed my PVCs in the 80's for the next week.

While I was waiting, I got a call from Doctor Q suggesting I might want to go get a Calcium Score[4] but that the insurance wouldn't pay for it. The good news was that it only cost $45. Basically this is a walk-in, non-invasive test that uses a very fast scanning MRI synchronized to an EKG hookup to image your heart while it is resting

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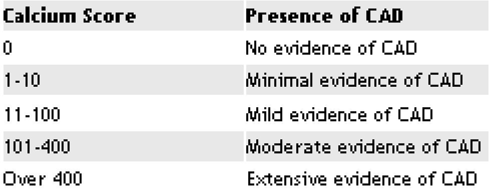
[3] http://openheart.net/procedures/tests/stressecho.htm

[4] http://heartdisease.about.com/cs/cardiactests/a/EBT.htm
http://www.radiologyinfo.org/en/info.cfm?pg=ct_calscoring
http://www.webmd.com/heart-disease/cardiac-calcium-scoring

between beats. It identifies general calcium deposits within the larger cardiac arteries and gives you a plot of the arteries with the areas of higher calcium buildup marked in black. The theory is that high calcium deposits correlates to high blockage. Maybe.

Depending on what website you go to, this is a big scam (hence the low cost - maybe a leader to a much more costly procedure) or a really useful thing. Whichever, I went and had one done just as another point of information. It only took 30-minutes and involved having an EKG-like hookup made for the MRI and then lying on the table while the imaging took place. The printout was available immediately and showed an overall score of 386[5].



Calcium Score	Presence of CAD
0	No evidence of CAD
1-10	Minimal evidence of CAD
11-100	Mild evidence of CAD
101-400	Moderate evidence of CAD
Over 400	Extensive evidence of CAD

At this point, with as much research into things as I could do from a lay standpoint and still no symptoms whatsoever, I was thinking that this was serious but not immediate.

The day of the 2nd opinion appointment, I took everything I had to Dr. B. I paid him directly since he wasn't in my network. He looked at everything and his opinion was "The question is not whether you should do the angiogram, but why you didn't have it done yesterday. What you have is the reason otherwise healthy 55 year old men drop dead in the street."

So … time for a complete rethink and reschedule of the angiogram.

The Angiogram

The angiogram was rescheduled for February 25 with very little pre-op fanfare. Bottom line, they thread a catheter up into the heart arteries and inject a radio-opaque dye so they can see how blocked the arteries are. This is a realtime process and you can watch it happen if you can stay awake. If there is less than 60% blockage they treat try to treat it chemically. When it gets to 80-90% (very subjective) then they try to put in a stent, a little inflatable mesh tube that enlarges the artery and contains the blockage.

In the US, most of the angioplasties thread the catheter up from the femoral artery in the inner thigh. The resulting wound has to be treated *very* carefully or there will be a lot of bleeding - basically you have to remain flat on your back unmoving overnight. An alternate route is the radial artery in the wrist. Here all that is necessary to recover is to keep pressure on it for about 15 minutes and you're good to be released. This latter is what my guy preferred, as do 60% of doctors in Europe compared to 10% in the US. The radial artery technique evidently requires a little more training and practice (it's a much smaller artery) and isn't as popular in the US, probably for that reason.

Either way, they'd like for you to be conscious but immobile during the procedure. But my nose was itching so bad that after I tried to scratch it a couple of times, the doctor told the anesthesiologist to "Put him out".

What they found was 80% blockage in the Left Anterior Descending artery (LAD) and 90% in the Left Circumflex Artery (LCA) – this latter is the one the Calcium Score missed. Way worse than I feared but still fixable. But the big problem was that they couldn't use the two stents that would be required because they would be too close together. The blockages were exactly where the Left Coronary Artery splits into the LAD and LCA.

So I was visited in Recovery by Doctor Q, who told me stents wouldn't work, and by a cardiac surgeon, Dr. P, who told me that I'd need a double-bypass in the next 4-6 weeks or earlier. So now it was obvious that more invasive action, specifically a 2-way bypass, would have to take place. Dr. P. talked with my wife, Kathi, and me

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[5] It also identified a Left Anterior Descending artery score of 280 and Right Coronary Artery score of 93. As it turned out in my case, the LAD was one of the problem areas. But it showed a score of only 13 for the Left Circumflex artery which was my other problem area. So … mixed results. Based on this, my impression is that the Calcium Score can give advice barring any other evidence but that the Angioplasty gives a real diagnosis. The angioplasty also showed some blockage in the Right Coronary Artery, but it was not deemed significant enough to treat.

for 20 minutes or so and then wanted to know if I was "a man of faith." I'm afraid my response may have been disappointing to him.

Three weeks and counting

Technically, what I was going to have was a double Coronary Artery Bypass Graft or CABG - usually pronounced *Cabbage*. The official description in doctor-ese was "*off pump coronary artery bypass graft x2 LIMA to LAD and RIMA to OM.*"[6]

After some thought as to some things I felt I needed to get done before undergoing major surgery, we scheduled the bypass operation for March 13th. Between the angiogram and the bypass, I had several what were apparently major panic attacks. Multiple bypasses are common now and I was a good candidate. Still, this is scary stuff.

After looking at a couple of support group web sites, I stopped looking. They were all *way* too negative and full of people whining about what had gone wrong with their CABG. I didn't need that sort of negativity. My brother had had similar surgery that didn't go so well and had sent me a really good book called Heart 411[7]. Lots of info and lots of cross tradeoffs.

The day before surgery we had another long talk with Dr. P and he was very open and up front about all the questions we had. Towards the end of the discussion, I asked Dr. P. what *my* specific risk factors were. He hesitated and said he'd have to put my risks in the 'weird' category - things like an unexpected reaction to the anesthesia or somebody dropping something in my chest cavity. I almost choked on my coffee - he definitely had a sense of humor. Something I think is good in a surgeon and doctors in general – but only if the patient has one as well.

During the three weeks between the angioplasty procedure and the bypass, I also did a lot of cleaning up personal affairs, trying to make sure Kathi knew where all the money was and sending her a just-in-case audio email that she wouldn't receive until it was all over. Also got the taxes done and submitted. I felt that Kathi was a lot better prepared for the worse case than my mother had been, but it would still be a steep learning curve if things went bad.

Neither of us expected that anything bad was going to come of this (you *have got to* think positive but at the same time plan for the worst). And while you tend to mostly hear horror stories, you don’t hear so much about the many more successes of heart surgery (which is why I'm writing this). Still, it is major surgery and anything can happen. Going into this I knew that even if it went well, there was still going to be at least a month of recovery[8]. But on the flip side, I don't have a lot of physical reserves and stamina. The doctors were all positive (what else would they be?) since I'm was moderately active and had no other underlying conditions such as diabetes, drinking, smoking, obesity or much of anything else other than sinus problems. And still no symptoms. And this was preventive and not trying to fix actual heart attack damage after the fact.

As time got closer, I found myself definitely short of breath and wiped out at the end of the day. Some of this may have been psychological but I think some was also the direct result of the stress test and angioplasty procedure diddling with my heart. This whole experience may have uncovered a bad underlying problem in the

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[6] The off-pump part refers to the heart lung machine which they had on hand just in case but which was not actually used. Off-pump is a better way to go because a) there is no need to splice the heart into the machine and b) it's therefore quicker. They have a dohicky like a sewing machine foot that they use to restrain the heart somewhat while they work on a specific area.

The LIMA/RIMA stuff refers to where the grafts went - the Left Interior Mammary Artery to the Left Anterior Descending artery and the Right Interior Mammary Artery to a point on the Circumflex artery back around behind the heart.

[7] Available from Amazon as a PDF http://www.amazon.com/dp/0307719901 - a lot of very good information but most of it didn't really fit my situation. Still, it was worthwhile to have and read while I was in question-asking mode.

[8] It turned out that I was walking around OK in a month with a few limitations on how much weight I could pick up, but Physical Therapy took another three months and it could be a year, or even two, for things to get completely back to normal. But at the time of this writing, 3-months after the operation, I’m doing pretty much anything I want to do.

blockages and prevented a future heart attack, but there is no doubt in my mind that the two procedures may have had some adverse affect in and of themselves.

I was still having an occasional panic attack which are what I'm pretty sure the breathing problems and heart pounding I sometimes had were. They tended to show up when I was lying in bed at night dwelling on things. They went away when I stopped thinking about them and got up and moved around.

The day before the operation, I visited the hospital to have a Pulmonary Function Test to see how well I was breathing for the anesthesiologist and to have the preliminary blood work done as well as take a tour of the ICU and recovery rooms. Scary, scary, scary seeing all those sick people in there. But all the staff seemed very professional and the facilities were outstanding (my impression based on zero previous experience).

I was also given two small packages of a special soap to wash my chest, stomach and neck with that night and again the morning of the operation. The instructions made it very clear I was not to get in on my face or groin.

The CABG Operation - Thursday, March 13

I obviously have no recollection of the operation itself. We got up at 4am on the 13th and I took another shower with the special soap. We got to the hospital right on time at 5:15am. I was sent straight downstairs and checked in by getting my wrist band - everything else had been done the previous day. The nurse walked us down to the admitting room where I changed into a gown and we waited. Dr. P. came down about 6:15 to have a final check and to say a prayer. At 6:30 or so the anesthesiologist's helper stopped by & put in an IV drip and give me a valium. At 7:30 the anesthesiologist showed up, wheeled me out and, after a final kiss from Kathi, rolled me into the operating room. I remember being rolled though double doors where the temperature dropped 20 degrees - it was cold. The OR was very impressive (physically and electronically). I remember only them starting an IV drip and positioning the big OR lights (hi power LEDs instead of bulbs) and doing some positioning of me, then I was out without any warning.

Rather than using the vein from my leg, which has attendant healing concerns and many people feel is the worse part of the surgery, Dr. P. instead used the Left and Right Internal Mammary arteries for the bypass. These are already connected to the aorta at one end so there is much less stitching to be done. The operation took 2-hours instead of the projected 3-4 - evidently because I had no fat and teasing out and attaching the two mammary arteries was much easier for it. The sternum was wired together and the outer incision was *glued* shut with something like superglue and no external stitches.

> [Kathi][9] At 7:30, I went out to the waiting room where I dozed and waited for KE. She arrived about 9:00 - no coffee. At 9:40, the OR nurse called to say that the bypasses were done and they just needed to close him up. Dr. P. came out at 10:00 to say everything was done and great, etc. etc. By the time WY got there with coffee and donuts, the operating part was over. We knew the ICU didn't want me around for a couple hours, so we sat downstairs to visit and eat donuts. MH came are 11:30 and we went up to check in at ICU. Clyde was asleep so we went to eat lunch. Kathryne had to go to work; MH, WY and I settled down in ICU waiting room.
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> At 1:30, I went to see if Clyde was awake yet.

At 10:00 Dr. P. came down to the waiting room to talk to my wife while I was being wheeled up to the ICU setup. I woke up there at sometime around 1:00 and my wife showed up about 1:30. The tracheotomy tube was still in and my hands were tied down, something I was really worried about going into surgery. Lots of horror stories about waking up with this big Alien tube down your throat. But it turned out to be a non-event.

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[9] Text in red was written by my wife, Kathi, while I was in the Hospital. MH and KE are my daughters and WY is a long time friend.

Post Surgery - Intensive Care Unit

I didn't come out of the anesthetic until I was already in the ICU and hooked up to everything. I’m pretty vague about that but the doctors and nurses and my wife were all there.

When I finally did wake up, there were, unexpectedly, three big 3/8 inch drains connected to piping that was sucking out stuff from my chest cavity. Plus a urinary catheter. Plus several other catheters in my arm and neck for various things. Plus the ventilation tube.

My hands were loosely tied, but they lengthened the cords so I could scratch my nose once it was clear to them that I was awake enough to not tear the ventilator tube or other connections out. They gave me a pen and paper so I could ask questions. But I asked too many evidently, because they finally took it away from me and told me to rest. So I started spelling out words on the back of my wife’s hand with my finger, one letter at a time.

I kept fading in and out as they'd turn the ventilator machine off to see if I could breathe on my own. I'd fade away (literally - they'd say "let's see if you can breathe on your own now" and things would fade out and go dark. Then they'd turn it back on and I was back.)

With the machine on, I could *not* breathe, talk nor even grunt. The ventilator was doing it all for me. The tube went into my lungs through my vocal cords and I couldn't groan or make any sort of noise whatsoever. With it turned off, I was breathing on my own but with the tube still in place so the ventilator could be switched back on quickly if need be.

At one point, I put my hands up and acted like I was typing on a keyboard. Some laughter. Another time, I wrote "bored" on the back of my wife’s hand and she told them. The head nurse responded by taking my hands in his, folding them together and started my thumbs twiddling. My wife left after a half-hour of this sort of thing to go back and sit in the waiting room with my daughter and some friends.

She came back at 2:30 as they were turning the machine off once more, telling me that if I could breathe on my own for 30 minutes, they'd take the tube out. I was still fading in and out until then. I have no recollection at all of when it was finally removed.

Kathi left at 6pm saying she'd be back around 10am the next morning.

I don't remember much about that night.

> [Kathi] Clyde was mostly asleep and had constant care in ICU, so I went home at 6:00 pm. MH and WY stayed with me all day and left when I did. I got home at 7:00, fed [our two macaws] and sat down to catch up on American Idol. I sent a bunch of emails to family and friends just to let them know that all was well so far. Went to bed lights out 11:30.

Friday March 14 – Out of ICU into Recovery

7:00am - Dr. P. had said he could get us out of ICU on Friday but it was 4pm before they finally took us down to the recovery room. I had cereal & three milks that morning for breakfast but it was gone by the time Kathi got there.

10:00am - Kathi arrived and ordered me a fruit plate and raisin bread toast for late lunch.

> [Kathi] Got birds up and put them in the dining room. Don't know what I was thinking. Walked in to ICU around 10 am. The first thing Clyde said to me was "Did you know that operation only took two hours? I don't think I got my money's worth."

Nothing much more until 4pm when they disconnected all the ICU stuff, moved me to a wheel chair and piled it with my record book and bucket of personal stuff. That stuff included a personalized heart-shaped throw pillow that was critically important.

Coughing hurt my chest like hell for the first week or so and hugging this pillow really did help. It was printed with a drawing of the heart and the personalization was where Dr P. had drawn in where the bypasses had been placed. I didn't need it after two or three weeks as the sternum healed.

Worse than coughing, though, was sneezing. I used to sneeze and hold my nose but I only did that *once* after surgery. Bad mistake. After that I tried to never sneeze through my nose, instead releasing the pressure through my mouth. Even that was iffy, but the problem and pain faded away 6-8 weeks after surgery.

They got me settled into the recovery room and Kathi left about 5:30 or 6pm to take care of the birds right after I was given pain medication.

> [Kathi] At 4 pm, the move from ICU to another room was hard. They took him in a wheel chair and getting him down in the bed was very painful. Gave him two hydrocodones for pain. They took until around 5:30 to kick in. I knew he would sleep a while and figured I would go home to put the birds to bed and get some sleep myself. It never occurred to me that he would sleep and wake up not knowing where he was or how to get help. The nurses and I had shown him the call buttons and I didn't realize just how loopy he really was with all that medicine in him. I should never have left him.
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> I put the birds to bed, got something to eat and watched TV for awhile. Went to bed early and slept straight through until 4:30. I turned over and went back to sleep figuring I had at least three more hours. At 4:50, the phone woke me up. It was from the hospital and when I answered, Clyde said, "Hello, I don't know where I am." We talked about it for a minute and I asked him if he wanted me to come up there right then. He said yes, he knew that was paranoid, but please come. I did my hair (sort of). Threw on some clothes, tossed some clean water and gorp at the birds and flew down 75. Got there at 6:00 am to find that he had an IV going to get his heart rate down from 98 or so. It is always around 65-ish. Evidently, he was disoriented, upset and in severe pain and his anxiety level took his heart rate sky high.

Friday night was bizarro night partially because I lost 12 hours, thinking the 8 on the clock meant 8am and wondering where Kathi was. But it was really *8pm* and all the people were different because the shift changed - people I didn't know kept coming in every couple of hours to take blood pressure, test sugar levels, give me pain meds or other stuff. I kept dozing off and coming back. The light level never changed and I completely lost track of time. The room got smaller, the bathroom disappeared. I'd call out and no one answered, but I could hear people in the hallway and see light under the door. I was seriously wondering if it was possible I'd been kidnapped or something. After a while it was 3:00 on the clock which I took to mean was 3pm when it was really 3am. The phone by the side of the bed wouldn't dial out until I was finally told that I had to dial "1" for an outside line. I was short of breath and having very vivid dreams or lucent dreams or nightmares that integrated the *Atlantis* series of Science Fiction books I'd been reading before surgery into a bizarre but very real fantasy.

Plus there were what I am now sure were hydrocodone induced hallucinations. Evidently about 1-in-5 people can't tolerate hydrocodone and I'm one of them. Once I while I was dozing and watching TV that afternoon, I realized my eyes were shut. But I could still see the room with Kathi laying on the sofa, reading. The TV was showing an Andy Griffiths movie and the wall picture beside the TV was a slowly twining mass of 1960's psychedelic color swirls. When I opened my eyes, the TV was off, the lights were off, the picture was just a picture and Kathi wasn't there.

They disconnected the three abdominal drains from the sucking machine on Friday as well. One of them, plus the urethral catheter was pulled out completely. That latter felt *very* weird if not almost painful for a couple of seconds. The other two drains were connected to tennis ball sized bulb drains that kept a mild suction on them until the ball filled up. They got emptied about once an hour with a record kept of how much was draining out. But those balls hung down to *my* balls and had about the same consistence but four times larger.

Saturday March 15

Saturday was pretty much a repeat of Friday including the hallucinations This time I was saving the world from a rogue Doctor Who who was populating all the universes with duplicates of himself, his companion and an evil Tardis. Then *they* would recursively do the same. The only solution was to destroy them all. Or something. Again, very vivid, very lucid and tying in with what was around me.

It may also have been that a lack of the usual noise makers I have while sleeping (Fan or random noise generator) contributed to the disorientation. It was very quiet and this stuff invaded my mental processes in their lack. Being waked up every hour or so for this test or that didn't help any either.

> [Kathi] It was a difficult day. The catheter had been taken out, so Clyde had to get up out of bed to get to the bathroom. My first clue that this was going to be a problem was when I noticed his hospital gown and bathrobe wadded up on the bathroom floor. That explained why he was naked in the bed, but not how he got that way. When I asked him, he said he had to go to the bathroom in the night. I asked if he called the nurse and he asked, Why? Hmmm.
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> He was told over and over to call a nurse to help, but he always forgot and when I reminded him and tried to get him to wait, he insisted that he needed to practice and he saw no reason to wait around. So, I helped him get up, take the oxygen tube off so he didn't strangle himself, and drag the stand with all the IV lines behind him into the bathroom. That was the easy part. The hard stuff came when he got back into the bed and aggravated all the places on his body that hurt. The pain was excruciating. After these episodes, the nurse usually gave him another round of pain medication and he went to sleep for awhile. But when he woke up, he had again forgotten that he can't get up by himself and here we went again!
>
> Early that day, I resolved not to go home that night, but to stay and sleep at the hospital. I told KE that I wanted to go home for a couple hours to pick up some things and she promised to come up and stay with Clyde while I did that. But by the time she came at 1:00 pm, I knew I couldn't go off and leave her to deal with this situation. So, she stayed and visited and was there when one of the scariest and most painful episodes went down - the one when the pain was so bad that he really couldn't breathe, which made him tense more, so more pain, so the breathing really stopped and panic set in. There didn't seem to be any way to break the cycle. While the technician ran for the nurse, I pulled Clyde to a sitting position, wrapped my arms around him and started rubbing his back to see if that would help him relax. It did and he started breathing again. By that time the nurse was there with pain killers and anxiety medicine. Yikes! What a price to pay for having to pee!

KE came down after lunch (with a stack of weird magazines) and while she was there, I had one of the bad back pains that led to extreme breath shortage - I absolutely could not breathe and was arching off the bed in pain. Kathi was holding me, rubbing my back. The attendant came back with the Day Nurse and I think they dosed me with Hydrocodone again. It finally cleared up but there were other spells throughout the day. The nurse thought they were related to the drainage tubes and that it would be better when they were pulled out on Sunday.

Notes KE took while I was in wacky-land at one point – probably due to my binging on Game of Thrones the week before.

The white dragons have [mumble] the dark dragons have two castles.

This one doesn't look too interesting. The kings left.

There's gonna be more dragons.

> [Kathi] All day I assumed that the pain Clyde was feeling was in the chest incision. It never occurred to me or the nurses that it was anything else. But late that night (Saturday), he was up sitting in a chair trying to ease the pain, and he made the comment that it was like a spasm. I thought that sounded weird, so I asked him to show me where the pain was. He reached around to his back and told me that's where it had been all day. The nurse was listening to this and as I was realizing that sounded like what was needed was more were muscle relaxers and anti inflammatory drugs than pain killers, she was going for an injection of anti inflammatory. From that time on, things got better.

Much later that night, around 1am, I had another bad attack and we, Kathi, I and the Night Nurse, all of a sudden realized that this was something totally separate from the chest stuff. I think I said something to the effect that it was like a spasm. She left and came back with an injection of Toradol which really did the trick. Unfortunately that particular medication doesn't come in pill form. Dr. P. suggested 800mg ibuprofen plus 500mg tylenol in its place after I got back home. They took me off the hydrocodone and put me on some other pain medication which worked just fine.

After this, things rapidly got better.

In retrospect, I realize that no one had asked exactly *what* was hurting and that I had assumed that what they were giving me was for the back pain I was feeling. The problem was never in my chest at all.

More weird dreams Saturday night, but more fragmented and not as compelling. The others were oh so *real!*

Sunday March 16

The rest of the drains were pulled out sometime Sunday and they began doing all the odds and ends necessary to kicking me out on Monday.

MH also came down. Very difficult to talk with her - my inability mostly. She didn't stay long and I don't blame her. I was definitely not good company.

> [Kathi] At 5:00 am, Clyde called the nurse and said he wanted a shower. She helped him do that, changed his bed, gave him his medicine, etc. He wanted to take a walk, so we did. The doctor came in at 7:00. Clyde felt better, pain not as bad. They finally took him off the IV so he didn't have to drag the tubes around with him. MH came in at 1:00 to visit awhile. When she left, I walked out with her and went home for awhile. Got clean clothes, hung out with the birds, changed the bed he would sleep in, scrubbed both bathtubs. KE came over to help me do my chores so I would have time for a nap before I went back. She went to do her grocery shopping and picked up some stuff I knew I would need when we finally came home. I tried to sleep, but couldn't. So, I took a bath, fed the birds and went back to the hospital.

Several times they made me get out of bed and walk down the hallway trundling my saline drip along and with my wife and a nurse ready to catch me if I looked like I was going to fall. The first time sas short (maybe 50 feet) and slow but by the end of the day I was making a complete loop of the floor. Still slow but a lot more steady.

Monday March 17

They disconnected everything today and sent me home along with a small bottle of that same soap that I was supposed to use daily until the surgeon told me to stop. The stuff is called Betasept and my understanding is that doesn't so much actually kill bacteria – it just keeps them from reproducing.

I went to bed that night a little after midnight, then got up a couple of times and finally went back to sleep at 1am. No problem going to sleep but then I woke up a little before 4am with severe shortage of breath, very dry mouth and the need to take a leak like I've never had to before. Got up and walked around for a while considering options and finally dialed 911 about 4:15. I woke up Kathi and told her and she jumped for her clothes. I'd been told to lock up pets, open front door, turn on porch light and make myself comfortable until they got there.

They arrived about 4:20 - 4 guys and a woman in a firetruck. They did a quick EKG, noted the PVCs, did a more complete EKG, checked blood oxygen levels, put me on oxygen for 10 minutes or so, read through the medications I was taking, consulted and came to the conclusion that this was probably 'just' a panic attack. Everything looked OK and while they'd take me to the hospital if I wanted the impression they gave was that it would be a waste. Plus I was feeling much better and had no real chest pain. The guy in charge noted that if they had to come out again, they *would have to* take me to the hospital. So I opted out. They gathered their stuff and left. I went back to bed. I had several other attacks like this over the next few weeks but I recognized them for what they were which made them much less of a problem. In fact, no problem at all.

Home Recovery - Two weeks

For the next two weeks, things were still going good but I still got winded quickly or with little effort. I could not drive for two weeks following surgery to allow the incision to heal. Driving evidently puts too much stress on the chest skin since there were no stitches, only surgical glue and a big ugly bandage covering the wound itself.

I was also not allowed to push, pull or lift more than 10 pounds for about three months in order to let the sternum knit back together.

But there was very little pain and I could get up and move around with no problem almost immediately. At one point, about a week after coming home, Kathi was driving me to Lowe's to get a bird feeder. We were driving along when she realized there were flashing lights behind us and pulled over. The officer came around to her side and asked if she knew why he had pulled her over. She said no and he said a plain-clothed detective at the last intersection had reported that the person in the passenger seat (me) wasn't wearing a seat-belt.

He was a young kid and started to say something else but I leaned over and said "There a reason, officer" and lifted up my sweatshirt to show him the chest bandage – a really ugly dead chicken yellow. He immediately changed track, backed off, put his hands up like he was warding off a vampire, wished us a good day, admonished us to drive carefully and left. We about cracked up. I still laugh about it every time I think of it.

At three weeks after surgery, Doctor P removed the big ugly bandage on my chest, pronounced that I was OK to drive but to still not lift more than 10 pounds until June and told me to stop using the special soap. He took a picture of him and me for his Facebook page and we were done.

I kept doing increasingly long walks around the block for an additional two weeks and then went down to a facility inside a local hospital to begin 12 weeks of physical therapy.

Physical Therapy - 36 sessions over 12 weeks[10]

For me, this involved 1-hour sessions on Monday, Wednesday and Thursday that gradually worked me up from 3-pound weights to 10-pound weights, 15 minutes at Level 4 on a stationary bike and 20 minutes on a treadmill at 3mph and a 4% slope. Doesn't sound like much but although it was grueling at times the improvement was noticeable. During all of this, an outstanding nursing staff had me hooked to a remote EKG. They monitored my

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[10] Yes, you could skip the physical therapy. But you will be highly advised not to do so and I totally agree. A pretty good reference article can be found at http://ptjournal.apta.org/content/86/12/1703.full. Although it focuses on therapy after stenting rather than CABG, I think it is probably applicable to both. There are other studies that show, again statistically, that completing a physical therapy course has long term positive results that are not there for those not taking physical therapy.

heart continuously and took my blood pressure at the start and finish of each session plus once in the middle. All this was recorded and sent to my cardiologist and Primary Care Physician every three weeks. The basic goal was a sustained 30-beats above resting pulse rate for an hour. On off days I was supposed to walk briskly for an hour. I sloughed off on this last part sometimes but generally tried to adhere to it.

All of this got me about back to pre-operative condition, but there is still a general weakness sometimes and occasional shortness of breath that they say will eventually go away if I keep up the exercising and walking.

The facility also had various short seminars to go to on nutrition, CABG, stress and several other topics. I went to most of them just because I was there anyway.

This facility also has a policy of allowing patients to continue using the equipment for 2 months, no charge, to encourage development of exercising habits. I'm not sure I'm going to do it, mainly because I try to get an hour a day exercise walking/swimming or as part of my Master Naturalist activities or yard work

The exit interview instructed me to get at least 1-hr a day where my heart rate was up to an age-adjusted target rate of 100-130 beats/minute.

Other Observations:

The following are some observations that, while I am *not* a doctor, I'm pretty sure are reasonably accurate. The main reason I'm including them is that they may form a basis for discussion with your doctor if you are faced with a similar situation. Costs will also vary greatly.[11]

1. **Your mileage may vary:**
   As I said at the beginning, for me, this operation went about as well as it could go aside from not having to have it at all. Other people have had problems from minor to severe and after a year or more are *still* having issues. I lucked into an outstanding suite of doctors/therapists and my entire out-of-pocket expense, because I was on a Medicare Advantage plan, was less than $1000 for a $160,000+ procedure and Physical Therapy. Depending on the insurance plan, my out of pocket costs could have run as high as $6,000-10,000. This would have been the case for me if I had switched plans at the beginning of the year. I considered it and, thank goodness, decided to stay with Medicare Advantage.

2. **Stents vs. CABG**
   Caveat- *Again, I am not a doctor!!* I was originally hoping for stents because everyone I knew who had bypass surgery had more problems with the legs healing than from the cardiac work itself. Stents initially sounded the easier way to go with a shorter recovery time. The tradeoff between stents vs. bypass was not discussed with me beforehand and I only found out about it through research after the angioplasty showed that stents were not an option.

   This is definitely a subject of discussion with your cardiologist and surgeon as are all of these observations.

   As I understand it now, the basic tradeoff is that a CABG *may* be a better long-term option if the patient is younger and able to withstand the bypass surgery itself with the resulting recovery and physical therapy.

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[11] If you're on Medicare or Medicaid, the Federal Government has a physician/facility cost comparison guide at http://data.cms.gov. It will show how many times the doctor/facility has performed procedure x and what it nominally charged for it in 2012. This may be of use in selection based on cost. I used it to see how many times a CABG had been performed.

Statistically CABG using the internal arteries is good for 30-40 years. Stents *may* be a better option if the patient is older or less capable of surviving a bypass operation or cannot do the physical therapy required. Statistically stents are good for approximately 10 years and then a bypass *may* be necessary anyway[12].

To be brutally honest, stents in older patients (80-90) may be the best option because the patient may die of other causes before the stent fails. The 10-20+ year failure rate of stents (by failure I'm referring to their clogging up with plaque like your original artery) is consistently and noticeably greater than the 10-20+ failure rate of a CABG. So younger patients, who still have 30-40 years left, are probably better off with a CABG. But even so, one report indicated at least 70% maybe 80% of stents were OK after 18 months.

So why the push for stents for me? I think, although I'm sure doctors and insurance companies would disagree, it's because insurance companies promote them (especially the newer Drug Eluding Stents) because they're easier, less invasive, require less experienced/trained physicians and are initially cheaper with relatively minor hospitalization. Obviously the insurance companies would prefer stents because for the cases they *do* work they are much more cost effective. Maybe I'm being paranoid. But I don't think so.

In my case, the original plan was to put in stents as part of the cardiac angioplasty procedure once the location of the blockages was determined. There was a definite prefeernce by my primary care physician and the cardiologist towards stents and really no consideration of a bypass until the stent plan failed.

But … the blockage was in both sides of the left main coronary right where it forks into the circumflex and left anterior descending arteries. They could stent one, but not both because the stent guy was uncomfortable placing two stents so close to each other that they would be almost touching.

If it had been possible, there's no doubt in my mind that the stents would have been put in. The recovery therapy would have been *much* shorter and the in-hospital stay almost non-existent. BUT *statistically* I would have had an overall lower life expectancy, a higher likelihood of a future bypass anyway and been permanently on stronger and more drugs to prevent reclogging of the arteries containing the stents.

I'm very glad it turned out the CABG was necessary. Given my relatively young old-age, CABG, while more expensive with longer recovery times, turns out to have higher out-year recover rates once you make it through the initial surgery and recovery. That's a biggie which wasn't really discussed with me although Dr. P (the cardiologist) and Dr. S (Primary Care Physician) both referred to CABG, especially using the internal arteries rather than leg veins, as "the Gold Standard" of heart care once it became obvious I would need it.

Some typical conclusions gleaned off the web that support this overall observation are:

(2008) For patients with multi-vessel disease, CABG continues to be associated with lower mortality rates than does treatment with drug-eluting stents and is also associated with lower rates of death or myocardial infarction and repeat revascularization.

(2013[13]) The respective 5-year survival rates in the 8,121 pairs of matched bypass and stenting patients were 80.4% and 73.6% (p<0.001), and the risk of death after bypass surgery was 29% lower than for

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[12] The italics are because the outcomes are highly variable depending on the patient, the doctors involved, their experience, the surgical facilities, the patient's habits and a host of other considerations. The only thing you can really go by is the statistics. All of this should be and can be discussed with your cardiologist and surgeon.

[13] http://www.ncbi.nlm.nih.gov/pubmed/23391171

stenting (hazard ratio = 0.71, 95% confidence interval: 0.67 to 0.77, p<0.001). Significantly lower risks of death for bypass surgery were observed in patients with LAD artery disease but not in patients without LAD artery disease. Significantly lower risks of death for bypass surgery were also found in all patient subgroups defined by the presence of selected baseline risk factors. CONCLUSION: For patients with multi-vessel disease, CABG continues to be associated with lower mortality rates than does treatment with drug-eluting stents and is also associated with lower rates of death or myocardial infarction and repeat revascularization.

(2012) To determine the recommended form of treatment, physicians must first consider the extent of the problem. For those who have multivessel or left main coronary artery disease, surgery, not percutaneous intervention (PCI) or stents, offers the best long-range outcome, according to David Taggart, MD, Professor of Cardiovascular Surgery at England's University of Oxford.

(2008) For patients with multi-vessel coronary blockage, coronary artery bypass grafting (CABG) has a lower 18-month mortality compared to percutaneous intervention with drug eluting stents, according to a study published January 24, 2008, in the New England Journal of Medicine. Edward Hannan and co-workers of the School of Public Health at the University of Albany, reviewed outcomes from the New York State Department of Health databases for 9,963 patients who received drug-eluting stents (DES) and 7,437 patients who underwent CABG between October 1, 2003, and December 31, 2004. The patients were followed until December 31, 2005. The risk-adjusted rate of death in 18 months was 6.0% with CABG versus 7.3% with DES for patients with three vessel disease, and 4.0% with CABG versus 5.4% with DES for patients with two vessel blockage. Both these differences were statistically significant (p<.03 and P<.003 respectively).

The results favoring CABG over DES are not surprising - they are consistent with earlier studies comparing CABG with bare metal stents (BMS) which has shown that there is no survival benefit or myocardial infarction benefit with DES compared to BMS. What was surprising in this study was the high repeat procedure rate after DES; 30.6% of patients had repeat procedures within 18 months (approximately one-third of these may have been planned staged procedures). This compares to a 5.2% repeat procedure incidence after CABG [emphasis mine]. *Only a small portion of these repeat procedures after stenting were related to the initially treated blockages, implying that repeat procedures are primarily needed for progression of disease elsewhere, not restenosis of the stented blockage. Stenting treats isolated stenosis, and progression of disease elsewhere, even in the same vessel, may require another procedure. CABG bypasses the current stenosis and the proximal two-thirds of the coronary artery where most future blockages occur, giving CABG a theoretical advantage over stenting, even if new stents are developed with no restenosis and no thrombosis.*

There are dissenting opinions and articles of course, as well as opportunities for bias, but I think, as things worked out, that I was fortunate. Whichever, it is what it is now - only time will tell.

Some other links that might be useful are

- http://health.usnews.com/health-conditions/heart-health/coronary-artery-disease/treatment
- http://bja.oxfordjournals.org/content/105/suppl_1/i3.full
- http://en.wikipedia.org/wiki/Electrocardiography (I was looking for 12-lead vs 5-lead EKG differences)
- http://www.ncbi.nlm.nih.gov/pubmed/18216353 (the 1st 2008 article)
  - http://www.sts.org/patient-information/adult-cardiac-surgery/cabg-information/lower-mortality-coronary-bypass

Should I need another bypass or other surgery, there will definitely be more discussion and questions asked.

3. **Angiogram entry point**

   My doctor went in through the radial artery in my wrist instead through the femoral artery in the leg. This saved me a stay in the hospital overnight plus having to lie totally still and totally flat for several hours afterwards while the femoral incision healed. If you have to go through this, definitely look for someone who does it this way as a preference. The femoral is good for a backup (I was prepped for both arms and both legs, just in case)

   By using the radial artery, recovery consisted of 15 minutes of pressure and a band-aid. No kidding. In the US, using the radial artery is done about 10% of the time - in Europe it's done 60% of the time. I'm guessing (and it *is* a guess) that it's because it requires a little more training and practice to work with the narrower radial artery and its twists and turns to get the catheter up around the shoulder to the heart.

4. **Interior Mammary Arteries vs. Saphenous veins**

   It used to be that one of the big leg (saphenous) veins was used to provide material for the bypass. And it still can be, depending on the doctor and the circumstances (the graft location, number of grafts, etc.) My Dr. P. didn't prefer them for several reasons:

   a. Harvesting them is a rather brutal process and although the removal usually heals just fine, there are definite possibilities for infection. Plus, from people who have used this, your leg is sore for a long time and in some ways takes longer to recover from that the cardiac procedure itself. Again, this depends on the circumstances and the patient.

   b. The leg vein is a vein and not an artery. It's not designed to handle the pressure from the aorta and although it usually works, there's an opportunity for both long- and short-term complications. Plus, you have to splice in both ends - one end into the aorta and the other where you want the bypass to take place. This means a longer operation than the one I had and it's more likely you'll require an on-pump rather than an off-pump procedure. And longer under anesthesia is not so good as shorter.

   c. The IMAs run down either side of the sternum and are already connected to the aorta on one end. So "all" that has to be done is to cut the far end and splice it into where the bypass is needed. If, however, an additional blockage occurs, either a stent or a leg vein will have to be used.

5. **Medications**

   Aside from the blood-pressure medication I was already taking (Benicar), I picked up several new ones directly related to the operation and underlying heart-related issues:

   - Amiodarone - Only for the 1st two months after surgery to help prevent fibrillation (not expected but just to be on the safe side.)
   - Generic Lipitor – to help reduce cholesterol and reduce likelihood of additional plaque buildup. Note that this precludes me from eating grapefruit in any form – slices, halves, or juice. It apparently, for reasons not fully understood, amplifies the effects of Lipitor and creates a danger of overdosing on a normal dose.
   - Metoprolol – a beta blocker to help keep my heart rate down in the 65 beats/minute range. This is for at least the first year and maybe permanently.
   - Baby Aspirin – serves as a mild blood thinner

6. Current Status

Pretty much I'm back to feeling like I did six months ago when I was first diagnosed. There's minor chest pain the day after I do something physically stressful that stretches a set of muscles that have been unused for a while. A couple of Tylenol help that as well as any exercise that bends my shoulders back and chest out. I prefer placing my hands on either side of an open doorway and leaning forward as far as I can. I'm sometimes short of breath for a moment or two after squatting down working on something and then standing up. A deep breath or two and the feeling goes away.

The most serious thing, to me, is that while I'm really OK walking a brisk 2-3 miles, if I sit down or lie down on a couch, especially at night, I'll find myself dozing off. According to my cardiologist, this could be the Metoprolol. I'm on the minimal dosage, but it's a known side effect. The need for it will be re-evaluated after a year or so.

But these are all minor things and could be due to being in my mid 60's as much as being due to the surgery and medication. On the positive side, I have a 'new heart' and am more aware of the need to move my eating and exercising habits toward a more healthy practice. I could do better yet, but changing lifetime habits is tough. It's a work in progress.

I still have some PVCs but only a few per minute and they tend to occur at two extremes – couch potato resting or exercising hard – but not so much as a normal state. I'm still not aware of them but they are clearly visible on a Veridian Model 11-50D Pulse Oximeter. This little gadget (about $50) clips onto a finger and, by analyzing the light passing through your finger from an LED, will tell you your pulse rate and blood oxygen level. The nurses used them in the ICU and recovery room as a quick test for these two things. This particular model also shows a real-time EKG-like heart-beat (the bottom wavy blue line in the picture) on which PVCs can definitely be seen as they occur.

While it's interesting to see the PVCs, I find this thing most useful for determining when my heart is up to its target rate when walking or after exercising or swimming. And a Blood Pressure cuff (about $160) is useful for checking my blood pressure periodically. I keep a record of this and take a listing to my doctor when I go in for a checkup.

Right now, my cardiologist is seeing me every three months but she says that rate may slacken off after a year or so. I see my primary care physician for everything else maybe twice a year as usual.

==

Clyde

7/20/2014 - 6 months after the initial diagnosis