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Case study in heart-brain interplay:
A 53-year-old woman recovering from mitral valve repair

ABSTRACT

This article presents the case of a 53-year-old female attorney who underwent successful mitral valve repair for mitral valve prolapse. The patient's postoperative course was marked by refractory pain, fatigue, shortness of breath, refusal to ambulate, frequent episodes of tearfulness, and a postsurgical decline in ejection fraction through postoperative week 4. Her slow recovery prompted a psychiatric consult, during which she reported panic and a fear of "losing it." After respective presentations of the case from the cardiology and psychiatry perspectives, the article concludes with a moderated discussion of the case to explore insights it provides into heart-brain interactions.

CARDIAC CASE PRESENTATION

A 53-year-old woman, a malpractice lawyer, with a history of mitral valve prolapse was diagnosed with severe mitral regurgitation and referred for mitral valve repair.

History and examination

The patient had no other cardiac history. She reported jogging 2 to 3 miles daily and playing tennis regularly, but over the past few months she had become more fatigued during her jogs, to the point that she occasionally had to reduce her pace and even shorten the duration of her runs.

On her initial visit, she expressed surprise regarding the severity of her mitral valve disease, as she had always been healthy. She seemed somewhat nervous but appropriately concerned about the impending surgery, and questioned whether she would be able to return to her previous level of activity. She also mentioned that she hoped the timing of the surgery would permit her to attend her son's college graduation in 9 weeks.

Her medical history was notable for mitral valve prolapse. She had a history of panic attacks, for which she occasionally took alprazolam. There was no family history of cardiac disease. She did not use tobacco and occasionally consumed alcohol. A review of systems was negative.

Her physical examination was unremarkable except for a grade 4/6 holosystolic murmur at the apex that radiated to the axilla, which was consistent with the mitral regurgitation.

A transthoracic echocardiogram demonstrated mitral regurgitation that extended through the left atrium back into the pulmonary veins. The left ventricular ejection fraction was 50%, which is considered low-normal. The degree of mitral regurgitation was 4+. No other significant valvular disease was observed.

An electrocardiogram revealed a normal sinus rhythm. Per our routine, the patient underwent cardiac catheterization, which showed normal coronary arteries.

An uncomplicated repair, but slow recovery

The mitral valve repair was performed without complications. The course in the intensive care unit was uncomplicated, and the patient was quickly extubated and transferred to a regular nursing floor.

On the nursing floor, controlling the patient's pain was difficult. She refused to use her incentive spirometer and initially refused to ambulate or even move from her bed to a chair. She was quite tearful.

A postoperative transthoracic echocardiogram revealed a satisfactorily repaired mitral valve with no mitral regurgitation. Her ejection fraction decreased to 40%, which is not unusual after mitral valve surgery.

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Her hospital course was notable for an episode of shortness of breath and tachycardia. Sinus tachycardia was evident on review of the telemetry strips. A repeat echocardiogram showed no changes compared with the prior postoperative echocardiogram. Spiral computed tomography was negative for pulmonary embolism.

Pain control remained difficult. The patient expressed concern about the postoperative decrease in her ejection fraction; she was reassured that a decrease in ejection fraction was not unusual, but she remained tearful. The family expressed concern because the patient "wasn't acting like herself," and her ambulation and use of her incentive spirometer continued to be minimal, which had the potential to hamper her recovery and rehabilitation. For these reasons, a psychiatric consult was requested and the patient was seen prior to discharge from the hospital on postoperative day 6.

Wound check at 1 week postdischarge

A routine wound check was performed 1 week after discharge, at which time the patient was still reporting pain that was more severe than would be expected at her postoperative stage. She reported concern about drainage from the incision. She said that she was unable to do much walking or stair climbing, and she reported sleeping in the guest bedroom on the first floor of her house because she was unable to negotiate the stairs to her bedroom.

A check of the wound showed minimal serous drainage at the inferior aspect and was consistent with normal wound healing. The slow progress of her recovery was a concern, as was the possible contribution of her anxiety to this slow progress, so we kept our psychiatric colleagues informed about the patient's recovery.

Follow-up at postoperative week 4

At the follow-up visit at postoperative week 4, the patient reported still being in pain, although the pain had improved, and complained of constant fatigue and shortness of breath that prevented her from returning to work. She had been discharged on lisinopril and admitted to occasional medication noncompliance. She said that if she did not improve dramatically and quickly, she would not be able to attend her son's graduation.

We considered the possibility of new ischemia, a large pleural effusion, postpericardiotomy syndrome, constrictive pericarditis, or a mitral valve leak as potential causes of her symptoms. A chest radiograph was obtained, which demonstrated a small left pleural effusion, and an echocardiogram showed that her ejection fraction remained at 40% and the mitral valve repair remained intact. The patient had a psychiatric visit scheduled later on the day of this follow-up visit and was referred to the cardiac rehabilitation program, to start on week 6 of her postoperative care.

PSYCHIATRIC CASE PRESENTATION

At the time of the first psychiatric consult, postoperative day 6, the patient's chart was reviewed, detailing her presentation and hospital course as described above. The chart confirmed one episode of "panic" following surgery while the patient was on telemetry, showing only sinus tachycardia. This episode was successfully treated with 1 mg of lorazepam. She expressed a fear of "losing it," which is how she characterized her panicky state during the hospital stay, punctuated by the feeling that she was not in control. The nursing staff reported that she was distressed and irritable. Her husband also confirmed that the patient "was not herself."

Her baseline functioning was high; she is a partner in a law firm and is customarily "in control." Before the interview began, the patient had several questions ready, including how quickly she would heal, how soon she could return to work and resume her normal activities, the reason for her low ejection fraction despite having mitral valve surgery, and whether or not she would be able to attend her son's graduation. Even though she knew the psychiatry consult had been ordered, she was not very receptive to it at first and was more focused on her physical symptoms.

Psychiatric history

Her psychiatric history was significant for fear of heights and panic attacks, but she had been able to conquer each. She overcame performance anxiety in high school and was able to be a successful malpractice attorney, deliberating cases in court. She had never seen a psychiatrist or mental health professional, and had never been on psychotropic medications, although for the past couple of years she had been using 0.5 mg of alprazolam to treat flight anxiety. She admitted to postpartum depression that lasted about 2 months; no treatment was sought at the time, and the depression resolved.

Family and personal history

Her mother was a teacher and a "professional worrier," and her father is a retired lawyer. She reported resolving to "suck it up" during times of adversity during childhood, but her childhood was otherwise unremarkable. She is an only child and finished at the top of her class at law school.

Review of symptoms

An assessment of depressive symptoms using the mnemonic SIGECAPS (disturbance of ***s***leep; disturbance of ***i***nterest; presence of ***g***uilt; disturbance of ***e***nergy, ***c***oncentration, or ***a***ppetite; increased or decreased ***p***sychomotor activity; ideas of ***s***uicide) elicited low energy levels, decreased concentration, and a "slowed down" feeling. The WART (withdrawal, anhedonia, rumination, tearfulness) scale, used to assess depressive symptoms in the medically ill, showed the patient to be withdrawn and tearful at times.

Mental status examination

The patient was polite, professionally courteous, and sitting up in bed. Her vital signs were stable (heart rate, 70 beats per minute; blood pressure, 122/72 mm Hg) and her mood was "fine," although she had many concerns about her physical health. Her affect was serious, constricted, and controlling. Her thought process was linear and organized, and her thought content revealed no psychosis, suicidal ideations, or overt hopelessness. She admitted that she was slightly anxious and overwhelmed, and that this anxiety precipitated her "panic" on telemetry and tearfulness, but she believed (and asked for assurance) that this level of anxiety was normal following surgery.

Diagnosis and recommendations

By the end of the consultation, we were able to make a series of recommendations. We arrived at a diagnosis of adjustment disorder with anxious features, and we agreed to treat her with alprazolam at a dose of 0.5 mg twice daily as needed. We provided education about mood and anxiety disorders in cardiac patients. We explained that her postpartum depression was a risk factor for future depression. We discussed coping strategies and relaxation techniques, and scheduled a follow-up appointment with her primary care physician for further monitoring of her mood and anxiety.

One week postdischarge

The cardiology team communicated with us after her wound check at postdischarge week 1. At this time, she was still having pain and was concerned about excessive wound drainage even though it was found to be minimal. The cardiology team was concerned because her progress was slow and she appeared anxious and tense. A follow-up psychiatry consultation was arranged for the patient's next postoperative visit.

Follow-up at postoperative week 4

At her scheduled psychiatric visit at postoperative week 4, the patient was a little surprised to see the fellow, as she expected to see the staff psychiatrist. She appeared tense and frustrated, was fixated on her echocardiogram and her physical symptoms, and reported that she was not yet back to work. She was preoccupied with her son's graduation that was coming up and wondered if she would be able to attend and celebrate it.

We administered the Patient Health Questionnaire depression scale, and the patient's score of 11 indicated moderate depression. Treatment options, including psychotherapy and pharmacotherapy with a selective serotonin reuptake inhibitor (SSRI), were reviewed with the patient. A call to the cardiology team revealed that her ejection fraction was fairly typical for a patient who has had a mitral valve repair but that the continued fatigue was not normal, leading us to suspect that depression may be the actual cause of her fatigue. She remarked, "Let's see how the cardiac rehabilitation program goes and then we'll talk about medications for depression."

Cardiac rehabilitation at postoperative week 6

The patient was entered into the cardiac rehabilitation program, and she was administered a Short Form–36 (SF-36) health survey, which showed a low mental summary score and a low physical component summary score (low scores connote worse health and/or more disability). She was referred to the psychiatrist at the cardiovascular behavioral health clinic for further assessment of her mood as she commenced the cardiac rehabilitation program.

DISCUSSION OF THE CASE

To explore management options in this case and discuss the insights it provides into heart-brain interactions, the case presentation was followed by an interactive discussion (moderated by Dr. James B. Young) between the physicians who presented the case and the Heart-Brain Summit audience.

Dr. James Young: Let's begin by considering whether there were some red flags that may have been apparent up front to predict that this patient might have been challenging in the postoperative period. I think one red flag was the diagnosis of mitral valve prolapse itself, which has been known to occur in type A personalities, who tend to exhibit catecholamine excess and sympathetic nervous system arousal that activates the autonomic nervous system.

Also, I'd be interested to know a few more findings from the patient's physical examination. Was she thin? Did she have a narrow anteroposterior diameter? Did she have pectus excavatum? Did she have

arachnodactyly tendencies? These are important characteristics that might have flagged the anxiety up front, as psychosomatic manifestations of patients with mitral valve prolapse were identified—and hotly debated—20 to 30 years ago. Although the link between mitral valve prolapse and personality type has fallen out of favor in cardiology circles, it clearly seems to describe this patient. The history of anxiety, panic, and possibly agoraphobia has been well described in patients with mitral valve prolapse and excematous degeneration.

I'd like to pose the following questions to the audience. What do you do with this patient now? Do you push medication therapy? Do you push psychotherapy? What is the next step?

Comment from audience: You haven't excluded the post-pump syndrome. This patient is very bright and it wouldn't take much of an insult to impair her sufficiently so that she would interpret the world in a different way. From my point of view, she needs sophisticated neuropsychological testing soon.

Dr. Young: That's a good point. We know that cardiopulmonary bypass is associated with difficulties and problems that have been underreported in the past.

Comment from audience: The last thing that this patient wants to admit or even allude to is a psychological problem. She is the last one who's going to even hint at it, which makes it very easy to miss. Look at how she reacted when she heard that there was a psychiatrist in the room. These patients are not necessarily well disposed to completing screening tests because they recognize that somebody is trying to identify a psychological problem. I don't know that I have the answer, but I think that we should avoid browbeating ourselves for the problem.

Dr. Young: I want to mention the cultural anthropology of physicians and how it affects our approach to treatment. I like being a cardiologist because I write prescriptions for drugs that have proven to be useful, such as beta-blockers and ACE inhibitors, among others. From this experience came my earlier question, "Should we give this patient a drug?" The cardiologist's focus—perhaps excessive focus—on pharmacologic solutions may not be the best way to approach this patient. You allude to some important issues about screening a patient for diseases that can be more easily treated.

Comment from audience: I have seen such situations as a result of drug interactions; many of our patients are on multiple drugs when they leave the hospital. The other issue to consider is sleep deprivation, with or without sleep apnea.

Dr. Young: Many complications, particularly in patients with heart failure, are related to disordered sleep, which certainly causes some heart-brain dysfunction. What about the drugs?

Dr. Thomas Callahan: We considered the effects of her medications, which included an ACE inhibitor and her analgesics. We also considered the lingering effects of anesthesia or other medications that she might have been receiving.

Dr. Young: Remember, she was reporting considerable pain. I suspect that she was on a cocktail of pain medications that might have been contributing to her difficulties.

Comment from audience: Morphine's effects tend to be stronger in women than in men. The other issue is the 10% drop in ejection fraction after the surgery. This patient may be thinking, "Why did I go through all of this if my ejection fraction is going to be worse?"

Dr. Callahan: A drop in the ejection fraction, especially after mitral valve repair, is common. We often address it with patients preoperatively, but perhaps not with everyone, and perhaps not clearly enough.

Dr. Young: Also, this is an example of a patient who had heart failure going into the operation, but "heart failure" would be the worst term to use with this particular patient. An ejection fraction of 50% is not normal for a patient with 4+ mitral regurgitation and, as Dr. Callahan suggested, when you take away the mitral regurgitation, you dump a little more load on the left ventricle, and the ejection fraction will go down. We see this all the time, although I admit that cardiologists or cardiac surgeons don't necessarily do the best job of discussing these subtleties with patients. Something we can take away from this case is a sense of the importance of improving our communications with patients about what they might expect postoperatively, although it still needs to be tailored to the individual patient. If this patient had understood the pathophysiology behind the drop in ejection fraction, it may have helped her. Other patients, on the other hand, may not require detailed conversations about this phenomenon.

Comment from audience: It was mentioned several times that the husband said the patient was not her-

self. Did you interact with the husband and the son to get a sense of the long-term dynamics of this family? It seems that there may have been some issues with the family dynamics.

Dr. Ubaid Khokhar: That's a good question, although no underlying dynamics seemed apparent. The husband and son's primary concern was that the patient's previous characteristics of perfectionism and always being "in control" were so much in contrast with the tearful episodes she was having now. "She is not the same," is how they kept phrasing it. However, there were no other significant changes—no rumination about suicide, no overt unwillingness to go along with treatment, or anything like that.

Comment from audience: I believe strongly that this patient was depressed, although she did not admit it. She had four of the five symptoms. She did not admit to a depressed mood but was tearful, which you reported at every postoperative visit. This is a sign of depression. We know very well that anxiety and depression often are present in tandem, especially in patients with high baseline anxiety. When they have more stress in their lives, they tend to get depressed.

I agree with the preceding comments that drug interactions are a potential worry; however, a few of the SSRIs have favorable drug-drug interaction profiles. I would urge this patient to try SSRI therapy. If she rejected this by responding, "I'm not depressed," you could point out that SSRIs work very well for anxiety. Alprazolam is not a good medication for anxiety because it has a very short half-life, which can leave patients with an increase in anxious feelings after the medication is cleared from their system but before their next dose.

In addition to SSRI therapy as a first-line approach, I would try stress management, biofeedback, or even psychosupportive therapy that relies on patient education to help this patient understand her condition and take back control.

CASE OUTCOME

Our initial approach with this patient was the path of least resistance. Very good points have been made by the discussants and members of the audience. This patient was attached to alprazolam because it was the only psychotropic medication that she had ever taken. For this reason, she was discharged on alprazolam even though it wasn't the ideal medication. As pointed out by the audience, the patient was quite resistant to the concept of having depression superimposed on a history of anxiety. In the cardiac rehabilitation setting she was again reassured by the exercise physiologists that her heart was doing well. A cardiologist personally reviewed the echocardiographic reports and films with the patient, pointed out the absence of unusual abnormalities with her heart, and suggested that something else was causing her symptoms. This direct explanation and reassurance from the cardiologist facilitated the patient's ability to entertain depression as a comorbid condition.

At the visit with the psychiatrist in the cardiac rehabilitation program, the patient finally accepted that her lack of confidence could also be a symptom of depression. We repeated the Patient Health Questionnaire, which still showed moderate depression, and we started her on an SSRI, citalopram. About 3 weeks later, she began to regain her confidence, and she was able to attend and host her son's graduation. By 8 weeks after the start of antidepressant therapy, a repeat Patient Health Questionnaire showed no evidence of depression.

Her progress, both physically and emotionally, was quite pronounced during the 12-week cardiac rehabilitation program. Her physical stamina improved, her fatigue abated, and her sense of confidence was restored. She successfully returned to work and her family concurred that she had returned to her "old self." She benefited from the stress management and lifestyle seminars that were offered in the cardiac rehabilitation program, and her exit SF-36 scores were much improved. The patient pleasantly surprised us all by taking the initiative of forming a monthly women's support group for coping with heart surgery.

She completed a 9-month course of the SSRI, with the depression in full remission, and has continued to follow up with her cardiologist and her exercise regimen.

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