Our Casebook

By Richard Braun, MD

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Case #1 – Fibromuscular Dysplasia

A 58 year-old woman applied for life insurance. She reported being in good health. Six months prior to the application she saw her doctor and complained of a “swishing sound in her ears.” They performed a computed tomographic angiogram (CTA) of the head and neck and found changes in the left vertebral and both internal carotid arteries consistent with Fibromuscular Dysplasia. The CTA report also indicated no presence of aneurysm or stenosis, and was otherwise normal. The records provided no documentation about follow-up action.

Question

What is Fibromuscular Dysplasia (FMD) and how does it affect morbidity or mortality?

Answer

FMD was first described in 1938. Making the diagnosis during life initially required invasive arteriography, which was typically done in symptomatic patients when the index of suspicion was high. With the relatively recent advent of CTA and Magnetic Resonance Arteriography (MRA) the disorder can be studied more easily and is more often discovered in asymptomatic individuals. There has been increased study of the

Figure 1 – Renal Angiography of FMD

The “string of beads” pattern (arrow) caused by alternating constriction and dilatation of the renal artery is characteristic of fibromuscular dysplasia.
FMD is described as a nonatherosclerotic, non-inflammatory disease of the vessels that may lead to arterial stenosis, dissection, occlusion or aneurysm. Its prevalence among the population is unknown. Studies of potential kidney donors found that 3.8%-6.6% had angiographic evidence of renal artery FMD. However, since many potential donors have close relatives with renal failure, this is not considered representative of the general population. A small autopsy study from 1970 reportedly found FMD pathology in about 1% of 819 consecutive autopsies. We do know that FMD is more common in women than men at an approximate 9:1 ratio. Carotid, vertebral and intracranial FMD has not been studied as much as renal FMD. Studies of these cerebral arteries by reviewing consecutive angiograms showed a prevalence of FMD of .3%–3.2%. Again, the clinical threshold for performing cerebral angiograms would make this population much different from the general population. A study of more than 20,000 consecutive autopsies at the Mayo Clinic detected only 4 cases with carotid FMD.

The diagnosis of FMD has become a radiologic one, and tissue is rarely obtained. The American Heart Association has proposed 2 classes of the disease: Multifocal disease consisting of the classic “string of beads” which is almost always caused by medial fibroplasia in adults (Figure 1, previous page), and focal disease consisting of one narrow point that can be of any length. Focal disease can be seen with intimal fibroplasia, medial hyperplasia or adventitial FMD. A single patient can have focal disease in one vascular territory and multifocal disease in another territory. Specifically for renal FMD, focal disease tends to be diagnosed at a younger age, has more males (female to male ratio 2:1) and had a higher rate of cure of hypertension after revascularization (54% versus 26% in multifocal disease).

Presenting clinical manifestations of FMD vary considerably. Only 5.6% of patients in the US Registry were truly asymptomatic. In the Registry the Top 10 presentations are listed in Figure 2.
thrombosis, arterial dissection or rupture of an aneurysm. In reviewing the presentation data of the FMD Registry, 13.4% of patients had suffered a hemispheric TIA, 5.2% had experienced amaurosis fugax, 12.1% had experienced cervical artery dissection, and 9.8% had suffered a stroke at presentation. The frequency of subarachnoid hemorrhage was 1.1%, and the frequency of cerebrovascular aneurysms (includes carotid and vertebral) was about 7%.

FMD lesions of the coronary arteries have been reported. Coronary artery dissection has occurred in some patients, resulting in myocardial infarction. The US Registry reported coronary artery disease in 6.5% of patients, but its cause (atherosclerosis or FMD) is unclear. We should also note that among patients in the US FMD Registry, 20% reported sudden death in first- and second-degree relatives.

Aneurysms are a well-documented complication of FMD. Asymptomatic brain aneurysms may occur in up to 7.3% of FMD patients, and in the US Registry 17% of patients reported an aneurysm of any artery (3.4% of the cohort had an aortic aneurysm, a higher percent than one would anticipate in predominantly middle-aged females).

Disorders in the differential diagnosis of FMD would include atherosclerotic vascular disease (ASCVD) and vasculitis. ASCVD is favored in older individuals with vascular risk factors like smoking, diabetes and hyperlipidemia. ASCVD also tends to occur in the opening (ostial) or proximal portion of vessels, while FMD is more commonly in the mid-portion or distal arterial location. Vasculitis can be recognized by elevation of acute reactants like Erythrocyte Sedimentation Rate (ESR) and C-reactive protein (CRP). The vessel’s “string of beads” appearance on imaging is characteristic of FMD.

Treatment of FMD includes control of hypertension and the opening or bypassing of symptomatic narrowing in affected arteries. Balloon angioplasty with or without stenting is often used to restore blood flow. Most experts suggest aspirin therapy to prevent platelet deposition in the irregular arterial sections. Stronger anticoagulants are often used in symptomatic or post-procedure patients. 72% of the original 447 patients in the FMD Registry had hypertension (as of 2012).

Angiographic studies of potential kidney donors noted that over a 2.5-7.5 year follow-up of those with FMD, 26%-29% developed hypertension. Therefore, those diagnosed with FMD should have blood pressure and serum creatinine monitored every 6-12 months. Additionally, all patients with FMD of any arterial distribution should be screened for intracranial aneurysms with CTA or MRA.

Following and treating those with cerebral aneurysms are the same as in the general population: those with aneurysms should be monitored with MRA to follow the size of the aneurysm. Those with FMD of the renal artery can also be followed with duplex ultrasound and by ultrasound measurement of the renal cortex. Atrophic changes in the renal parenchyma may result from chronic ischemic damage.

Returning to the Case
The US Registry for FMD was started in 2008, so long term follow-up is lacking for this condition. One of the stated goals of the American Heart Association study group is to determine the natural history of FMD and to develop tools for risk stratification of FMD patients. Some studies of small numbers of patients with extracranial FMD (carotid and vertebral) from the 1980s reported the risk of stroke and TIA at 0-5% per year. However, the patients were heterogeneous and lacked uniform treatment and follow-up. Some case reports have documented progression of cervical FMD lesions over time, and there is clearly an association of FMD and arterial dissection, although
Housecalls

no prospective data controlled for hypertension. It would be reasonable to expect an evaluation of the renal arteries and aorta by ultrasound or another modality in this case given the association of FMD with aneurysms. If studies are normal and proper treatment and follow-up is started, we might anticipate a moderate extra mortality risk.

References


Case #2 – Bariatric Surgery

By William Rooney, MD, FAAFP, EMBA
Dr. William (Bill) Rooney is Vice President, Medical Director at SCOR Global Life Americas. Dr. Rooney’s responsibilities include facultative case review work, researching and updating SOLEM, researching and writing articles for a variety of SCOR publications and more. He earned a medical degree from the University of Missouri – KC (1981) & an Executive Master’s in Business Administration from Benedictine College in Atchison, Kansas (2009). He is board certified in Family Medicine with the American Board of Family Medicine.

A 57 year-old male is applying for $1 million of life insurance. He has a history of morbid obesity (Pre-op BMI of 51) and Type II diabetes. Eight months prior to application he underwent a weight reduction surgery, specifically a laparoscopic Roux-en-Y gastric bypass (LRYGB, Figure 1). He had a complication, a pulmonary embolism, during the immediate postoperative period, from which he recovered. He has lost 20% of his excess weight since the surgery. His HgbA1c level has improved from a pre-operative value of 8.1% to a current value of 6.9%. He has missed several follow-up visits with the management team, including a visit to the dietician and the psychologist. However, office visit notes do mention adherence to his postoperative medications. He otherwise has had no complications or concerns.

Questions
2 major questions arise when evaluating a case like this for mortality risk.
1. What are the short-term and long-term mortality implications of Roux-en-Y weight loss surgery?
2. What is the likelihood of morbidly obese Type II diabetics undergoing Roux-en-Y weight loss surgery obtaining diabetic remission?

Answer
First, let’s briefly review a few facts. The World Health Organization defines a body mass index (BMI) of ≥ 40 kg/m² as morbidly obese. Obesity incidence is increasing in the US and worldwide. In 2010 about 33.8% of the US population were clinically obese. Obesity has major mortality and morbidity concerns for an individual. Figure 2 lists major medical
conditions associated with obesity that can adversely impact mortality.

Over the last several decades an increasing number of obese individuals have undergone weight reduction surgery (when more conventional weight loss programs have failed). In 2011 approximately 340,000 weight reduction surgeries were performed worldwide, with about 220,000 of those being done in the US. Many studies show short-term weight loss effects, including the impact weight loss has on some weight-related comorbid conditions. Unfortunately, few studies document long-term results. Does the length of time an individual carried excessive weight influence outcomes? Does the age that excessive weight was first added matter? These and other questions have not yet been answered.

Figure 3 outlines the combination of BMI and comorbid conditions where bariatric surgery may be advisable in adults.

Several surgical procedures (e.g., jejuno-ileal bypass, gastroplasties) have been largely abandoned due to either excess morbidity or mortality, and/or ineffective results. Other surgical procedures are currently being performed (Figure 4, next page). Bariatric surgeries can be categorized into either restrictive or malabsorptive procedures, with some surgeries combining elements of both. Restrictive procedures restrict the volume of the stomach in some way. The restriction significantly limits the amount of solid foods that an individual can ingest at a sitting. Such procedures are generally associated with more gradual weight loss.

Malabsorptive procedures diminish the absorption of consumed nutrients by making food bypass part of the intestine where absorption occurs. These procedures are more difficult technically than restrictive-type procedures.

Bariatric surgery has demonstrated a number of benefits. Short-term medical outcomes for morbidly obese Type II diabetics undergoing weight reduction surgery include:

Weight loss. Typical weight loss depends on several factors including the type of procedure performed (Figure 4, next page). Before surgery practitioners calculate excess weight by determining the weight that exceeds a BMI value of 25 kg/m². After surgery weight loss in most studies ranges from 50%-80% of excess body weight.

Diabetes. In 2011 the American College of Surgeons Bariatric Surgery Center Network reported the results of 28,616 patients. One year after surgery, 83% of patients undergoing a Roux-en-Y gastric bypass, 55% receiving a sleeve gastrectomy procedure and 44% undergoing an adjustable gastric band procedure had remission or improvement in their diabetes.

Figure 2 – Conditions Associated with Morbid Obesity which Can Impact Mortality

<table>
<thead>
<tr>
<th>Condition</th>
<th>BMI</th>
</tr>
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<tbody>
<tr>
<td>Ischemic heart disease</td>
<td>≥ 40kg/m²</td>
</tr>
<tr>
<td>Diabetes, Type II</td>
<td>35-39.9kg/m², with at least one of the following comorbid conditions</td>
</tr>
<tr>
<td>Non-neoplastic chronic kidney disease</td>
<td>30-34.9kg/m² with comorbidity</td>
</tr>
<tr>
<td>Cancer (e.g., breast, prostate, liver, kidney, endometrial, colon, cervical, thyroid, ovarian, leukemia)</td>
<td></td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>Obstructive sleep apnea</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Asthma</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>Hypertension</td>
</tr>
<tr>
<td>DVT and PE</td>
<td>CVA</td>
</tr>
<tr>
<td>Depression</td>
<td>Infection</td>
</tr>
</tbody>
</table>

Morbid obesity increases the likelihood of many impairments that adversely affect mortality, as noted in the table above.

As outlined by the National Institute of Health Consensus Development Panel in 1991 and endorsed by the American Bariatric Society in 2004, recommendation for surgery depends on both BMI and comorbid factors.
Other comorbid conditions. The same American College of Surgeons’ report indicated improvement in other comorbid conditions, including improvement in hypertension, sleep apnea and hyperlipidemia. Multiple studies have documented similar improvements.

Serious short-term complications of bariatric surgery include pulmonary embolism, myocardial infarction and/or return to the operating room for revisions or repair of stenosis, obstruction or anastomotic leaks. Some bariatric surgery centers quote a 10%-20% follow-up operation rate after bariatric surgery. The type of procedure affects short-term complication rates.

Generally speaking, laparoscopic-type procedures have less morbidity and mortality than open procedures, and laparoscopic adjustable gastric band (LAGB) procedures have less morbidity than laparoscopic Roux-en-Y gastric bypass (LRYGB) procedures. Morbidity outcomes associated with laparoscopic sleeve gastrectomy procedures fall somewhere between the LAGB and LRYGB procedures. Perioperative mortality rates are similar among these three procedures. The overall 30-day postoperative mortality rate is typically less than 1% according to the most recently published series.

Bariatric surgery mortality rates are higher for individuals who exhibit:

- More complex operations
- Development of any adverse intraoperative or in-hospital event (e.g., PE, acute respiratory failure)
- BMI ≥ 50 kg/m²
- Older age (>65 years of age)
- Medical comorbid conditions
- Male gender
- Low-volume of bariatric procedures by surgeons and in hospitals

Serious long-term complications of bariatric surgery include short bowel syndrome, dumping syndrome, metabolic and nutritional derangements, renal failure and postoperative hypoglycemia. Complications may be short-term or long-term, such as stenosis, obstruction and leaks. In addition, many of those undergoing surgery regain excess weight.

Physicians have not studied the long-term remission of Type II diabetes enough to fully understand the expected benefits. However, a recent article published in JAMA analyzed the findings of 343 diabetic bariatric surgery patients in Sweden. 2-year diabetes remission rates were 16.4% in the control group and 72.3% in the bariatric surgery group. At 15 years, the remission rate was 6.5% in the control group and 30.4% in the bariatric surgery group. They also found that longer-duration diabetes (≥4 years at time of surgery) was less likely to remit.

### Table 1: Mechanism of Weight Loss

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mechanism of Weight Loss</th>
<th>Frequency</th>
<th>Typical % of Excess Weight Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roux-en-Y gastric bypass</td>
<td>Restrictive and malabsorptive</td>
<td>47%</td>
<td>70% (2 yr.)</td>
</tr>
<tr>
<td>Sleeve gastrectomy</td>
<td>Restrictive</td>
<td>28%</td>
<td>60% (2 yr.)</td>
</tr>
<tr>
<td>Laparoscopic adjustable gastric band</td>
<td>Restrictive</td>
<td>18%</td>
<td>50%-60% (2 yr.)</td>
</tr>
<tr>
<td>Bilio-pancreatic diversion with duodenal switch</td>
<td>Restrictive and malabsorptive</td>
<td>&lt;5%</td>
<td>70%-80% (2 yr.)</td>
</tr>
<tr>
<td>Mini-gastric bypass</td>
<td>Restrictive and malabsorptive</td>
<td>&lt;5%</td>
<td>50% (18 mo.)</td>
</tr>
</tbody>
</table>

The Roux-en-Y procedure is one of the most common and effective (short-term) bariatric surgeries performed today.
than shorter-duration (<1 year) disease. This same study evaluated microvascular and macrovascular complications, finding a decrease in both in the surgical groups. In fact there was a 43% reduction in myocardial infarction and 31% reduction in overall mortality. Larger long-term studies may confirm benefit likelihood.

In summary, obese individuals frequently choose bariatric surgery to control excess weight. Short-term complications from the surgery are possible, and the rates and types of complication can vary based upon type of surgery. We’re still studying the long-term benefits and complications, and we lack conclusive findings for now. However, short- and long-term findings in several studies are quite encouraging.

Returning to the Case
The applicant has lost a considerable amount of weight already, which is not unusual for this type of procedure. It is not uncommon to experience rapid weight loss over the first six months (10-15 pounds/month), continuing through the following 12-18 months (5-7 pounds/month) until eventually plateauing. The improvement in his hemoglobin A1c is also fairly typical. Improvement in diabetics’ metabolic control is noticeable within days or weeks after a LRYGB procedure. He also has had no known surgical complications following hospital discharge from the LRYGB procedure.

The failure to adhere to medical follow-up, however, might be a red flag. Adherence to appropriate medical follow-up is helpful to ensure long-term success with weight loss and to monitor the need for medications to avoid hypoglycemic reactions, to evaluate for surgical complications and to monitor for any longer-term nutritional deficiencies. Finally, he does have several of the factors involved in potentially increased mortality (i.e., perioperative complication, BMI >50). All of these factors will have an impact on the individual consideration of this case. Given the procedure performed, he may still lose another 50% of his excess body weight, although one might expect this to have occurred in the 8 months since surgery. At a minimum he should be evaluated at the current control of the Type II diabetes.

References


Underwriting Puzzler...
By William Rooney, MD, FAAFP, EMBA

In this issue of the Puzzler Dr. Rooney presents another EKG, from a 54 year-old male applying for life insurance. How would you interpret this EKG?

To find the answer, be sure to visit the Housecalls page on www.scorgloballifeamericas.com. Click on the “December Puzzler” Powerpoint presentation to confirm your findings.

SOLEM Improvements and Closing Notes

Where did 2014 go? We hope that you and yours can relax and enjoy some time during the upcoming holidays. Looking ahead to 2015, Santa’s elves are busy putting the final touches on updates to SCOR Global Life Americas’ electronic underwriting manual (SOLEM). During the first quarter we’ll be adding sections on amyloidosis, angiodysplasia, arteriosclerosis of the aorta, agammaglobulinemia, aortic root dilatation, aphasia, underwriting frailty in the elderly (falls, fractures, Timed Up & Go), Long QT Syndrome, syringomyelia, and Gardner Syndrome. As always, we welcome your feedback on SOLEM and suggestions on how to make it more useful.

From the Medical Staff at SCOR Global Life Americas, we wish you Happy Holidays and a busy and prosperous New Year.

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