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An Approach to Transmetatarsal Amputation to Encourage Immediate Weight Bearing In Diabetic Patients

**ABSTRACT**

Transmetatarsal amputation remains the standard treatment for the unsalvageable diabetic foot; however, this operation is often complicated by wound dehiscence, ulceration, the need for additional surgery and tendon balancing. This technique provides an uncomplicated suturing method for closure of the standard transmetatarsal amputation. A drill hole is created through the first and second metatarsals for closure of the standard transmetatarsal amputation.

**KEY WORDS:** diabetes, amputation, early weight bearing, limb salvage, transmetatarsal

**INTRODUCTION**

Transmetatarsal amputation (TMA) is a common and effective procedure for limb salvage in the diabetic population. The value of this amputation level is the improved efficiency and functionality of gait. A functional limb is imperative for limb preservation and overall mortality of diabetic patients [1].

The mortality rate of diabetes significantly increases with more proximal levels of amputation [5]. Brown et al., compared five-year mortality rates in patients with transtibial amputations, partial calcanectomies and total calcanectomies, Choprer’s amputations, transmetatarsal amputations and noted that transmetatarsal amputations have the lowest five-year mortality rate at 30% [3].

Functionality and a sound frame of mind are the primary goals when...
choosing a procedure for limb preservation. In a study by Anthony et al., 52 transmetatarsal amputations were performed and only 19% healed after the initial operation. A more proximal amputation was required in 56% of patients and 93% were ambulatory at a median of 18 months follow-up. 

Wound dehiscence with subsequent infection may lead to a more proximal amputation. Dunkel et al. found that of 289 transmetatarsal amputations, 16.3% suffered a wound dehiscence and 21.8% had stump infections(5). Higher infection complications associated with transmetatarsal amputations have been observed in patients with diabetes mellitus and peripheral vascular disease (Fig. 1). Patients with infection but no underlying peripheral vascular disease were significantly more likely to heal a transmetatarsal amputation (6). Pollard found that in 101 transmetatarsal amputations, stage renal disease is a predictor of poor wound healing potential. In the study, 57.4% of the transmetatarsal amputations healed completely, however, 87.1% had post-surgical complications.

In a study by O’Brien et al., 1209 transmetatarsal amputations were evaluated and early amputation failure was observed to occur 26.4% of the time. Of these transmetatarsal amputations, delayed amputation to a more proximal amputation was performed within 30 days(7). Nguyen et al. observed 33 patients with transmetatarsal amputations, 36% of these patients required a more proximal amputation and the average time to the more proximal amputation was three and one-half months (8).

The literature supports adequate peripheral perfusion and glycemic control in preventing postoperative complications in diabetics. Younger et al. concluded the primary factor determining healing potential was glucose control, suggesting to never perform elective surgery on diabetic patients with a hemoglobin A1c (HbA1c) over eight unless to save life or limb(9).

Overall, transmetatarsal amputations have been found to be a standard procedure with functional outcomes. Various modifications of the technique have been described. This article will illustrate a technical modification that has encouraged early weight bearing in the postoperative course.

SURGICAL TECHNIQUE

Ancillary tendon balancing procedures may be performed at the discretion of the surgeon. The transmetatarsal amputation is performed in a standard fashion maintaining the appropriate metastatal parabola for optimal plantar pressure across the distal residual foot. The second metatarsal should remain the longest followed by the first, third, fourth and fifth metatarsals (10). Metatarsals may be beveled plantarly, laterally, and plantarly to save life or limb. Proximal tendon balancing helps to avoid wound dehiscence which may lead to infection and prolonged non weight bearing. Early weight bearing not only encourages tendon re-balancing but improves blood flow by means of enhanced vasoreactivity and increased angiogenesis which improve oxygen delivery to cells and tissues (14).

Fig 1 TMA complications often require additional surgical procedures and significant delays in uncasted locomotion. The wound healing complication experienced by the patient above delayed functional ambulation for eight months. Fig 2 Two depictions of the course of the amputation used to secure the required fasciocutaneous flap. The horizontal mattress suture helps keep the transmetatarsal amputation as distally as possible in lieu of a PS-2 or SH needle for ease of passage through the drill hole. The mattress suture begins externally through the plantar flap, passes through the metatarsal drill hole in a dorsal to plantar direction, and exits parallel to the entrance site of the suture where it is then instrument tied (Fig 2). The subcutaneous layer may be closed with simple interrupted sutures of 4-0 absorbable Polyglactin 910 (Vicryl®) and Ethicon, Somerville, NJ). The final skin layer is approximated with a 4-0 Prolene®. A drain may be placed at the discretion of the surgeon (Fig 3).

The drain is removed on the first postoperative day. A modified Jones compression dressing and modified fiberglass total contact cast are applied with the residual foot positioned at 90 degrees to the leg. Protection of the wound allows for early weight bearing encouraged in the postoperative day in the modified total contact cast regardless of triceps surae lengthening, tibialis anterior tendon lengthening, or tibialis anterior transfer (Fig 4). The sutures are removed three to six weeks post operatively. The cast is then bivalved and removed postoperatively to allow inspection of the incision. A compression dressing is applied and the existing fiberglass cast is rewrapped and secured with an elastic bandage (Sterile Matrix Elastic Bandage, Medline, Mundelein, IL) or self-adhering bandage (Cuticle™ LF, JM, St. Paul, MN) (Fig 4). A period of protected weight bearing in this fiberglass cast should continue until the sixth postoperative week after which patients are transitioned into a diabetic shoe with toe filler, modified above-knee foot orthosis (AFO). The postoperative course is demonstrated in the Table.

POSTOPERATIVE COURSE

<table>
<thead>
<tr>
<th>Postoperative Day</th>
<th>Postoperative Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>Modified Jones compression bandage/total contact cast applied, protected weight bearing commences</td>
</tr>
<tr>
<td>14-21 days</td>
<td>Cast bivalved and removed to allow for inspection of the incision. Bivalved cast reapplied and secured with self-adherent or elastic bandage</td>
</tr>
<tr>
<td>2-3 weeks</td>
<td>Sutures removed</td>
</tr>
<tr>
<td>5 weeks+</td>
<td>Transition into KAFO or diabetic shoe with toe filler. Continue diabetic foot care visits</td>
</tr>
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</table>

DISCUSSION

Transmetatarsal amputation is the standard treatment for unsalvageable forefoot ulceration and pathology. Several studies have catalogued a variety of complications, such as ulceration, wound dehiscence, and need for additional surgical amputation following TMA. This procedure can provide a functional residual foot... Additionally, the security of the anterior flap helps to avoid wound dehiscence which may lead to infection and prolonged non weight bearing. Early weight bearing not only encourages tendon re-balancing but improves blood flow by means of enhanced vasoreactivity and increased angiogenesis which improve oxygen delivery to cells and tissues (14).

Following TMA, total healing rates range from 44-92%, and amputating rates exceed 77%. One retrospective review of 91 TMA demonstrated a total of 69% of limbs were healed at follow-up. Primary healing occurred in 46% of residual limbs and significantly increased the likelihood of ambulation (p=0.001) and overall limb salvage (p<0.0001) [15]. Log amputation was more common when the TMA was not closed (58%) in comparison to when it was sutured or stapled primarily (32%) [16]. Patients with infection, but otherwise without a diagnosis of ischemia were significantly more likely to heal than those patients with ischemia [17]. Landry examined predictors of healing in patients with TMA, and found that independent ambulation is significantly more likely in patients with healed TMA (73%) than in patients with non-healed TMA (4%) (p<0.001). In addition, non-ambulation was a predictor of mortality following TMA (62% vs 36%; P = .04) [18]. The authors concluded that TMA is a reasonable choice for patients with a greater likelihood of continued ambulation following the amputation.

Compared to other procedures, the TMA provides better patient outcomes in several categories. Various studies demonstrate ambulation rates of less than 50% in transtibial amputations. Additionally, the time required to rehabilitate after a transfemoral amputation is much longer than what is required following TMA. Friedmann stated that limb preservation at the transmetatarsal level not only improves gait by “maintaining a foot lever arm,” but “reduces all but part of heel-off and toe-off lowers energy expenditure by smoothing the path of the center of gravity during walking,” compared to a more proximal amputation that requires prostheses [19]. Pinzur et al advocate performing the amputation as distally as possible to preserve limb function and therefore the ability to walk postoperatively. Sixty-four patients undergoing midfoot amputation had a total healing rate of 81%. When serum albumin, total lymphocyte count, and Doppler ischemic index were optimized the healing rate improved to 92%. The authors conclude that energy expenditure (continued on p.19)
Depression in Heart Failure: A Teachable Moment

By Rakim Kumar Ghosh MD and Keyvan Ravakhah MD MBA

CLINICAL VIGNETTE
A 51-year-old woman with a history of nonischemic dilated cardiomyopathy and New York Heart Association class III heart failure (HF) presented to the emergency room with chest tightness, shortness of breath, increasing pedal edema, and weight gain for two weeks. Her most recent echo-cardiogram demonstrated a left ventricular ejection fraction of 25–30%, thought to be secondary to cocaine abuse for the preceding two years. Her current admission was her fourth in the past year. During each hospital admission she was treated aggressively as a case of exacerbation of heart failure. Of note, she resides alone in her home and has been deemed “non-compliant” with medical therapy, such as discontinuing her diuretic and continuous positive airway pressure (CPAP). Her past medical history was significant for hypertension, morbid obesity, hyperlipidemia and obstructive sleep apnea, which were treated with appropriate medications.

Her physical examination disclosed a jugular venous pressure of 12 cm of water, grade II/VI holosystolic systolic murmur at the cardiac apex with radiation to her left axilla, bilateral pulmonary rales, and significant pedal edema up to both knees. Apart from elevated B-type natriuretic peptide and elevated troponin, her remaining laboratory investigations (including complete blood count, thyroid and liver function tests, urine toxicology, electrocardiogram and chest radiograph) were normal. She was started on intravenous furosemide 40 mg twice daily and her other home medications were re-sumed. During her hospital stay, she mentioned feeling worthless, fatigued from recurrent admission, a severely restricted social life, and her inability to perform work for the past year. These had not previously been recounted to her medical providers, and prompted a screening test. Patient Health Questionnaire-9 (PHQ-9) was administered to her. Her score was 14 out of 27 points, consistent with moderate depression. Psychiatry service was consulted and she was scheduled for cognitive-behavioral therapy. Her follow-up visit after 3 months showed improvement of her PHQ-9 score by 8 points with no hospital readmission during this interval.

TEACHABLE MOMENT
Heart failure (HF) is a burgeoning chronic health condition affecting more than 20 million people worldwide. Patients with HF have a significant (17.1%) 30-day readmission rate, which involves substantial financial penalty to payors from Centers for Medicare and Medicaid Services, as per the newly introduced Hospital Readmissions Reduction Program. Depression is an independent poor prognostic factor in HF patients in terms of mortality and rehospitalization which leads to increased cost of healthcare and poor quality of life. [1] It has a significant prevalence in patients with HF and contributes to the overall poor quality of life in these patients. Several behavioral (smoking, obesity, lack of exercise and medication non-compliance) and pathophysiological factors (hypertension, elevated natriuretic peptides) affect these patients.

Table 1: EFFECT OF INTERVENTIONS ON DEPRESSION IN HF

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Improvement observed in physical function, HRQOL and cardiac event-free survival.</th>
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<tbody>
<tr>
<td>CBT</td>
<td>Improvement in physical function, HRQOL and cardiac event-free survival.</td>
</tr>
<tr>
<td>Problem-solving with internet-based CBT (CBT-h)</td>
<td>Several notable drug interactions between antidepressants and HF medications.</td>
</tr>
<tr>
<td>MODD-HF trial</td>
<td>Failed to show significant improvement of depression with Extraprilom.</td>
</tr>
</tbody>
</table>

Cognitive Behavioral Therapy (CBT)

- Improvement observed in physical function, HRQOL and cardiac event-free survival.
- Promising results with internet-based CBT (CBT-h).
- Several notable drug interactions between antidepressants and HF medications.
- MODD-HF trial failed to show significant improvement of depression with Extraprilom.

Behavioral therapy

- Treating depression with antidepressants may not always improve HF outcomes.
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Hospice Care: Its Place in the Evolving Models of Healthcare

By Nana Yaa Korom MD MPH; and Dervilla McCorm MD MPH

Hospice / həˈspis/ noun — a home providing care for the sick, especially the terminally ill.

Archaic: a lodging for travelers, especially one run by a religious order.

HISTORY OF THE HOSPICE MOVEMENT

Hospice, like many other American customs, is an import. The term, in medieval times, referred to a resting place for weary travelers. Dame Cicely Saunders is credited with the creation of the first modern Hospice, St. Chris- topher’s, in London (1948). Further impetus was supplied by the book “On Death and Dying” by Dr. Elisabeth Kubler-Ross, who argued that the need for more assistance for families and patients who wanted final care at home, in the form of both physical and spiritual help. Congress passed a Medicare hospice benefit in the Tax Equity and Fiscal Responsibility Act of 1982, and this benefit was made permanent in 1986 by Congress. In 1989, only 35% of eligible hospice facilities were Medicare-certified and low reimbursement was cited as one of the reasons for slow growth of the program. A 20% increase in reimbursement was therefore granted, and future increases in funding were tied to the hospital market through the Omnibus Budget Reconciliation Act (1989). Gradually, other organizations and government agencies began reporting on hospice care, and in 1993, the Clinton health reform proposal included hospice as a nationally guaranteed benefit, symbolizing its national acceptance.

By 2004, more than 1 million Americans were served by hospice. Non-cancer diagnoses were brought to center stage when the American Heart Association and the American College of Cardiology released new practice guidelines for treating heart failure that included recommendations regarding the early use of hospice. In 1990, 16% of Medicare hospice recipients had non-cancer diagnoses, but by 2012, more than two-thirds of patients had alternative diagnoses, such as dementia, congestive heart failure and chronic obstructive pulmonary disease (COPD).

HOSPICE TRENDS FROM INCEPTION TO 2014

Since 1982, when the Medicare hospice benefit was authorized, hospice has become increasingly integrated within Medicare, and has shown a reduced demand for end-of-life care in recent years (Rezae, et al., 2013), after which reclassification is needed for the beneficiary to switch, or revoke hospice care (CMS, 2015).

HOSPICE PAYMENT MODEL

Since the inception of the Medicare Hospice Benefit, hospices have been paid on a daily per diem rate, with this global payment covering all care related to the terminal diagnosis (MedPAC, 2010). This capitated per diem rate is fixed regardless of the care needs of the patients or the services pro- vided (Wachterman, Maranto- nio, Davis, & McCarthy, 2013). The categories of care provided are routine home care, continuous home care, inpatient respite care and general inpatient care, with the per diem rate changing based on the category of care pro- vided (MedPAC, 2010). Routine home care providers services at home, under the care of the patient’s attending physician, and comprises the vast majority of hospice days covered by Medicare (94.1%), with continuous home care covering periods of patient care that can be accommodated at home (Nicola, Reardon, Lorenz, Lynn, & Beewkes, 2009). Inpatient respite care covers short periods to provide the primary care provider a break, and inpatient care is for situations that cannot be managed in other set- tings (Nicola, Reardon, Lorenz, Lynn, & Beewkes, 2009). Current diagnosis coding includes 283 agencies. Many of the big- gest chains are themselves sub- dadies of larger corporations.

For-profit hospices also have a higher profit margin, relative to non-profit hospices, which may be attributable to having a higher proportion of patients with non-cancer diagnoses, who tend to have longer LOS and require less skilled care (Rezae, et al., 2013). Recognizing that America is undergoing the greatest de- mographic shift in its history, in which 20% of Americans will be over 85 by 2030, the Institute of Medicine (2014) was prompted to examine problems with integra- tion of systems to support the provision of quality care consist- ent with the values, goals and informed preference of people with advanced serious illnesses.

Additional recommendations were made for reform in ambulatory hospice delivery, required reporting of quality measures, and enhanced professional education and skills development along with public education and engagement to ensure high quality of care de- liveries at the end of life.

ELIGIBILITY FOR HOSPICE CARE

Medicare hospice care is covered under Medicare Part A, covering hospital admission care (Rezae, et al., 2013). To be eligible for Medicare hospice services, the patient’s attending physician and the hospice medical director must certify that the individual is terminally ill, with the certification of terminal illness supporting a life expectancy of 6 months or less (CMS, 2014). Since 1988, the basic requirement of hospice care is that a patient unceases curative treatments in order to receive hospice care (Taylor, 2012). Hospice- care is available for two peri- ods of 90 days and an unlimited number of 60 day extensions for 30 day periods (Rezae, et al., 2013), after which reclassification is needed for the beneficiary to switch, or revoke hospice care (CMS, 2015).

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Although it is paid for through Medicare part B, neither Medicare nor Medicaid currently use the language “Palliative care” in the description of ever-increasing categories of services. As a result, insurance coverage for palliative care is inconsistent, and incomplete. Frequently, patients must absorb costs for palliative care through copays and coinsurances to Medicare part B. Private insurance is also inconsistent in coverage for palliative care, despite recent evidence that palliative care is cost effective. (May, P. Palliat. Care 2014).

AFFORDABLE CARE ACT AND ITS EFFECT ON HOSPICE

In 2009, CMS implemented a seven-year phase out of the Budget Neutrality Adjustment Factor (BNAF), a key element in the calculation of the Medicare hospice wage index, resulting in a permanent reduction in hospice reimbursement rates of approximately 4.2% (NHPCO, 2015). The introduction of the Affordable Care Act (ACA) further altered the Medicare hospice rate formula through the introduction of a “productivity adjustment factor,” which will reduce annual hospice payments by an additional 7.4% over the next 10 years (NHPCO, 2013). Additionally, hospice payment authority has been transferred from Congress to the Secretary of Health and Human Services, who is mandated to collect and analyze data in order to implement a new hospice payment model (NHPCO, 2011).

SUGGESTED PAYMENT REFORMS

Suggested payment reforms include a case-mix or outlier adjustment to the hospice payment model, as permitted in other areas of Medicare payments (Reze, et al., 2013). In addition, it has been noticed that hospice costs follow a mandatory payment system with higher utilization and costs at the beginning, followed by relatively equal costs, whereas a LOS (length of stays) increases, and hospital higher resource use just prior to death (GAO, 2004; Huskamp, Stevenson, Grabow, Breneman, & Keating, 2008). Several research conclusions have recommended an intensity-adjusted payment model accurately reflecting resource use patterns (Reze, et al., 2013). Hospice care for nursing home residents has been found to cost much less than for non-resident hospice patients, suggesting possible financial benefits for hospice to serve nursing home patients (Huskamp, Stevenson, Grabow, Breneman, & Keating, 2008). Therefore, payment refinements specific to nursing home hospice care has been proposed, with a downward adjustment to hospice per diem rates for nursing home residents, and a separate end of life Medicare benefit for hospice care, reducing the risk of system abuse and hold them accountable for quality end-of-life (Reze, et al., 2013).

CONCLUSION

Hospice care is a vital and indispensable service to people with terminal illnesses, as well as the landscape of hospice providers is changing. Additionally, there is a disconnect between how the public wishes to be treated at the end-of-life and how care is actually delivered. Under the current payment model, Medicare remains the biggest payer. The current global per diem payment model allows system abuse and payment fraud and provides no incentive for quality. The Affordable Care Act has proposed changes to the current payment formula, with the introduction of a production adjustment factor, potentially redefining payment patterns by up to 7.4% the IOM report, “Dying in America” suggest the need for a description of comprehensive hospice system, its payment, delivery, and monitoring model, along with redesign of physician education, quality assurance, and policy reform to encourage an integrated approach to care. Perhaps in no other phase of life is the payment so vulnerable, and the need so great to provide care with true value; the highest quality care for the terminally ill at the fairest price.
Leriche’s syndrome: A rare complication following anterior approach lumbar spinal surgery

ABSTRACT
Leriche’s syndrome is an aortic occlusive disease, which is due to obliteration of distal aorta above the site of bifurcation of common iliac arteries. Post-surgical acute Leriche’s syndrome is rare and needs a strong index of suspicion to diagnose. We report a case of thrombotic occlusion of infrarenal aorta with acute presentation following anterior lumbar interbody fusion surgery (ALIF). The diagnosis was made from presenting symptoms leading to major bleeding or hemostasis formation, erosions or pseudoaneurysm formation of the vascular complications of lower spinal surgeries [2, 3, 4]. However, most injuries are delayed due to chronic irritation of the aortic wall. The majority of spinal surgery complications highlight neurological sequelae, while vascular issues are less frequent [5]. Post spinal surgery Leriche’s syndrome often misdiagnosed because of overlapping symptoms of pseudo-claudication from spinal fusion complications. We highlight a case of acute Leriche’s syndrome after Anterior Lumbosacral Interbody Fusion (ALIF) surgery, and its presentation.

CASE PRESENTATION
A 58-year-old male patient presented to the hospital 3 weeks after ALIF surgery at L2-LS1, performed due to lumbar spinal stenosis. He reported sudden numbness, tingling and weakness of both lower extremities from the waist down. He was soft on palpation and normal bowel sounds heard without any tenderness. In neurological examination, there was loss of sensation to fine and crude touch in both lower extremities up to the mid thighs (L2-S1) and 4/5 power with +2 reflexes (patellar and ankle). The motor and sensory system of L1 distribution was normal. Babinski’s sign was present bilaterally. Rectal sphincter tone was normal. Patient had no sensory or motor deficits in the upper limbs. X-IX cranial nerves intact. Vitalis were stable.

Review of operative note revealed, that anterior aspect of lumbaris spinal was reached by the surgeon through retroperitoneal approach, followed left paramedian incision. Exposure of the disks was accomplished after mobilization of left iliac vessels prior to the right side and retraction by a malleable retractor. During disk removal and positioning the cages, the major vessels were mobilized to right side and protected by the retractor. No direct injury to any vessels or excessive bleeding leading to hemostasis was noted intraoperatively. The operative time was approximately 4 hours.

WORK-UP
Routine blood works including complete blood count with differential, complete metabolic profile, erythrocyte sedimentation rate, C-reactive protein, creatinine kinase were normal. Due to strong suspicion of complications from recent spinal surgery Computed Tomography (CT) of the thoracolumbar spine was ordered which showed anterior interbody fusion changes at L2-S1 with intact hardware. Mild to moderate multilevel central canal narrowing was noted in CT scan; which was secondary to scar tissue in the anterior epidural cassettes, consistent with recent surgical history. Imaging study ruled out any critical central canal stenosis, acute lumbar aortic injury or paraspinal abscess. There was no enough evidence of myelopathy and radiculopathy from the CT and blood works, explaining his condition. He did not improve despite steroid treatment as well. Then we started looking for vascular causes. CT angiography of abdomen and pelvis was performed, which ruled out intraproidal hematoma or aortic dissection. However, there was extensive aortoiliac atherosclerotic disease with long segment occlusive thrombosis of infrarenal abdominal aorta by a crescentic mural thrombus (Figure 1 and 2). As part of acute thrombosis, arterial wall work up, hypercoagulable studies were normal. No abnormal cardiac rhythm including atrial fibrillation was detected in the telemetry. Transthoracic echocardiogram ruled out any left atrial thrombus. There were no compressive lymph nodes or any other structure compressing on the aorta. Diagnosis of acute Leriche’s syndrome was established which was attributed to acute vascular injury following ALIF. The patient underwent emergent aortoiliac endarterectomy (TEA) and aortobifemoral bypass (AFB). During the surgery, acute Leriche syndrome was established, which was attributed to acute vascular injury following ALIF.

DISCUSSION
Leriche’s syndrome is an occlusive disease of aorta which is characterised by triad of symptoms like erectile dysfunction, claudication of thighs and legs and diminished or absent femoral pulses [6]. There are many causes of acute Leriche’s syndrome like surgical manipulation, trauma, thrombo-embolic disease, hemorrhage, aortic injury, atrial fibrillation, neoplasm, intraproidal hemorrhage in an aneurysm. Post-surgical Leriche’s syndrome is rare and needs a strong index of suspicion to diagnose. Surgical treatment of adult lumbar spinal disorders are associated with substantial risk of intra, peri, and postoperative complications [7]. A systematic review conducted by Wood et al. [8] showed that vascular injury in elective anterior lumbar surgery is less than 5% and complications being thrombosis, pulmonary embolism, and prolonged hospitalization. It is shown that vascular complications after anterior fusion (ALIF) range from 1.9 to 5.6% in the general population [5, 6]. The vascular complications can be in the form of acute thrombosis, retroperitoneal hemorrrhage and injury to the major blood vessels.

We highlight the rare case of acute Leriche syndrome following ALIF surgery which was initially misdiagnosed. Firstly, the patient’s presentation of sensory and motor impairment misled physicians to have impression of neurology. Secondly, ischemic neuropathy is rarely caused by Leriche’s syndrome [9, 10]. Another reason for misdiagnosis is his recent spinal surgery, although the patient was at risk for thrombus formation due to risk factors and atherosclerosis, the interesting part was the acute presentation of symptoms. There was a case study in 2003 which reported 8 cases of Leriche’s syndrome in which possible risk factors were analyzed. The authors encountered six cases of common iliac artery occlusion and two cases of acute avascular necrosis of aorta after anterior fusion (ALIF) in which possible risk factors were analyzed. The authors encountered six cases of common iliac artery occlusion and two cases of acute avascular necrosis of aorta after anterior fusion (ALIF) in which possible risk factors were analyzed.
Boerhaave’s Syndrome: The Importance of Early Recognition

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Boerhaave’s syndrome is a transmural esophageal perforation of the esophagus with increased intraluminal pressure from straining, vomiting or coughing combined with negative intrathoracic pressure.[2,3] Approximately 15% are spontaneous[4] while 85-90% are iatrogenic. The incidence is about 3,100,000 cases per year.[5]

Mortality rate is 14% for treatment onset within 24 hours of incidence versus 27% after 24 hours and is heralded by mediastinitis and sepsis.[6] Hence, the aim of this report is to underscore the impact of an early gastrografin fluoroscopy diagnosis on treatment outcome.

CASE REPORT

A 35-year-old Caucasian man presented with sudden onset of sharp retrosternal chest pain of 1 hour. This started immediately after the inability to swallow the first bite of his breakfast. Pain was rated 9/10, non-radiating, worse with deep breathing and followed by vomiting of bright red blood. He denied cough, SOB, fever and chills. He had a history of type 2 DM, arthritis (with long-term use of ibuprofen) and alcohol abuse. He denied smoking, social use of tobacco, no recent trauami and a negative intrathoracic pressure (with negative intrathoracic pressure).[2,4] This results in a nocuous course. This is due to the attachment of the esophagus to the paravertebral fascia slowing the risk of further extension of the paravertebral fascia slowing the location of the perforation. However, a controversy lies in the risk of further extension of the paravertebral fascia slowing the location of the perforation. Hence surgical intervention was the only life-saving measure, based on the mortality rate comparison between early versus late disease recognition and treatment.

Surgery may include primary repair of the defect, drainage of fluid collections, diversion or esophagectomy. An alternative treatment for poor surgical candidates is placement of metal or plastic stents via EGD. There’s a high rate of migration and stricture of the plastic stents respectively.[12]

In this patient, within the first 24 hours, aggressive management was instituted in the ICU with IV fluids and broad-spectrum antibiotics. This was an important life-saving measure, based on the mortality rate comparison between early versus late disease recognition and treatment.

The fibrosed esophagus from chronic dysphagia, mechanical dilation and NSAID use precluded salvaging the esophagus. Hence surgical intervention was the only life-saving measure, based on the mortality rate comparison between early versus late disease recognition and treatment.

REFERENCES


Figures 1 & 2: EGD showing the perforated esophagus with true and false lumens

Figure 3: Chest x-ray showing atelectasis in the right lung base with soft tissue air at the lower neck.

Figures 4 & 5: CT thorax with contrast showing h/ pleural effusions, pneumomediastinum and right-sided pneumothorax
Knowledge of Advance Directives in the Primary Care clinic at St. Vincent Charity Medical Center

By: Kalsoom Fatima MD; Aajay Kumar MD; Sibhikumar Manvar MD; Syed Nasim MD; Neelima Rao MD; Nana Yaa Koram MD MPH; Lloyd Cook MD

With the current advent of hospital medicine, most primary care physicians are ceasing the inpatient care of their patients to hospitalists, whom they do not have a close relationship with the patient, and so may have never had the opportunity to discuss their advance directives with them. The importance of initiating the conversation about advance directives in the outpatient department cannot be overstated.

The primary purpose of this study is to determine the knowledge, attitudes and practices of patients in the primary care clinic of St Vincent Medical Center towards Advance Directives and Living Wills. The secondary purpose of this study will be to facilitate the discussion of ADs and living wills between patients in the outpatient departments and their primary care doctors by encouraging the patients to bring up the topic with their doctors.

METHODOLoGY

Subjects were randomly recruited from the Internal Medicine Primary Care Clinic over a period of 1 month. The subjects were asked to complete a questionnaire. The questionnaire collected basic demographic information, and also asked questions about knowledge of advanced directives, and current advanced directives prescription and planning. The data was collated using Excel, and analyzed using SPSS.

RESULTS

Two hundred and one questionnaires were distributed to patients in the outpatient clinic during a 1-month period. Of 201 questionnaires, 151 patients (75%) had completed ADs, and 77 had completed a living will (38.3%). The majority of respondents (66%) were in the age group of 51-75 years, with 14% of respondents being 18-35 years, and more than 75 years. Eighty-four respondents (43%) were single, with 37% (73) married, with family or relationship, 9% (17) were divorced and 11% (22) were widowed. Most of the respondents were in a low socioeconomic status, with 76% (109) of those who stated their income earning less than $50,000 annually. Thirty-one patients (22%) earned $50-100,000 annually, with a very small percent age (2.8%) earning more than $300,000. Majority of the respondents (42.5%) lived alone, with 37.7% living with a partner, and only 3% living with their children in a nursing home.

Regarding insurance status, Medicare was the most prevalent form of insurance (44%), with private insurance being the second commonest form (24.5%). Medicaid was the insurance coverage for 15% of patients, whilst 10% had no insurance coverage at all. The highest educational status for most of the patient was high school or equivalent (44.5%), followed by community college (27.1%), and some college (20.4%). Concerning their healthcare status, 62.1% being married or in a relationship, 9% were divorced and 6% were in a life-long partnership.

Of the respondents, a large majority (62.1%) were not aware of what an advanced directive was, only 20.6% being aware of what an advanced directive was. Only 20% of respondents had an advanced directive, with 59% having no form of advanced directive. Of those who had an advanced directive, the commonest form of advanced directive was the living will (62.5%), with 18.8% having either a healthcare proxy or both living will and healthcare proxy. Of those who did not have an advanced directive, 14.2% said it was because they were too young, whilst 5.6% of respondents were too healthy and 18.8% thought it was too time consuming to complete one. Majority of respondents (46.1%) did not give any reason whatsoever for not having an advanced directive. Interestingly, on a Likert scale of 1-5, 53% of the respondents thought advanced directives were very important to have, whilst only 9.6% of respondents thought advanced directives were not important to have at all. The highest educational status for most of the patient was high school or equivalent (44.5%), followed by community college (27.1%), and some college (20.4%). Concerning their healthcare status, 62.1% being married or in a relationship, 9% were divorced and 6% were in a life-long partnership.

DISCUSSION

Advance directives allow patients to document preferences regarding healthcare in the event of impaired mental capacity or a terminal illness. The various forms of advance directives include living will and health care proxy. Despite the benefits of advance care planning for patients, primary care physicians face barriers to effective counseling on the issue, including their limited time and a lack of clinic-based support [18]. From our data, an overwhelming majority of the respondents had no more than a high school diploma, the most common reasons for not having an advance directive included being too young and healthy, and not really exercising one's right to refuse treatment. This was an interesting finding, as most of the respondents were middle aged, falling in the age bracket of 51-75 years. There was also a high prevalence of at least one chronic disease, with some having at least 2 chronic disorders. Majority of the patients (88%) had also been hospitalized at least once in the past year due to an acute or chronic medical condition. We can therefore infer that the patients may not have a very clear understanding of their chronic ail ments, and therein the need for advance directives, so that their future healthcare wishes would be clearly spelled out. The fact that an overwhelming majority of the patients (75.3%) did not want to discuss advance directives at the time of filling out the questionnaire may indicate healthcare proxies rather than patients having advance directives. Of those who wanted to discuss advance directives during that visit, they were counseled and given the option of filling out an advance directive then or at a subsequent visit.

This study shows that there is a dearth of information among our patient population concerning advance directives. Barriers to advance directives mentioned by the patients include lack of knowledge about advance directives, and attaining a low level of importance to the issue of advance directives. The various forms of advance directives include living will and health care proxy. Despite the benefits of advance care planning for patients, primary care physicians face barriers to effective counseling on the issue of advance directives of their own.
CONCLUSION

With the current costs of health-care spiraling out of control, it becomes important to address the unmet need for unnecessary medical treatment cannot be overemphasized. The Dying in America Report emphasized the need to integrate advance care planning into clinical care (20). Our study showed that the lack of knowledge about advance directives is a significant lack of knowledge about advance directives, and indicates the need for more counseling in the primary care setting about advance directives.

References

Transmetatarsal amputation
(cont. from page 4)

Leriche syndrome
(cont. from page 12)

Several transmetatarsal amputations were performed for chronic vascular disease, and there was no evidence of a history of trauma. All patients had extensive atherosclerotic disease involving the lower extremities, with occlusion of major arterial vessels. In one patient, the aorta was totally occluded, and the right common iliac artery was only partially patent. The other patients had subtotal occlusion of the iliac arteries, and the common femoral arteries were significantly narrowed. The patients were all diabetic, and had severe neurovascular disease. All patients had undergone multiple operative procedures for lower extremity reconstruction.

The etiology of Leriche syndrome is unknown, but it is thought to be due to a combination of endothelial damage and atheromatous plaques. The exact mechanism of injury is not clear, but it is believed to be caused by shearing forces on the arterial wall during active walking.

The clinical presentation of Leriche syndrome is characterized by chronic ischemic pain and ischemic rest pain, usually in the foot and ankle. Other symptoms include claudication, palpable pulses, and arterial bruits. The diagnosis is usually made by non-invasive imaging studies, such as Doppler ultrasound or magnetic resonance angiography.

The treatment of Leriche syndrome is primarily surgical, with arterial reconstructive procedures such as bypass grafting or endarterectomy. Medical management may include antiplatelet therapy, anti-coagulation, and diabetic control.

References
ABSTRACT
There are a variety of metallic internal fixation devices available to the foot and ankle surgeon. Fixation plates, Steinmann pins, Kirschner wires, staples, and intramedullary nails are employed to achieve stable fixation of arthrodesis surfaces, fractures, and osteotomies. Metallic internal fixation devices can create impediments to accurate postoperative imaging. Specifically, radiopacity on plain film radiographs and a decrease in operative time allows for enhanced visualization of arthrodesis surfaces and fracture sites and could aid in achievement of optimal positioning and alignment. It is proposed that enhanced visualization leads to less use of intraoperative fluoroscopy and a decrease in operative time [3]. Additionally, the unobscured view can potentially afford an accurate assessment of the progression of fusion or fracture healing during the postoperative course. Nonunions and delayed unions can potentially be identified earlier and appropriate intervention can be initiated sooner. Unlike metallic IM nails, that create artifacts on MRI and CT, Carbon Fiber nails do not exhibit signal pile up or signal loss [4]. When viewing an MRI image of a patient with a metallic implant, significant signal loss and signal pile up is encountered if the implant is not parallel to the magnetic field. This impediment to visualization is avoided even when a carbon fiber implant is not parallel to the field [4].

Carbon Fiber is radiolucent on plain film radiographs, allowing for unobscured views of cortical and cancellous bone on intraoperative and postoperative radiographs. This quality allows for enhanced visualization of arthrodesis surfaces and fracture sites and could aid in achieving optimal positioning and alignment. It is proposed that enhanced visualization leads to less use of intraoperative fluoroscopy and a decrease in operative time [3]. Additionally, the unobscured view can potentially afford an accurate assessment of the progression of fusion or fracture healing during the postoperative course. Nonunions and delayed unions can potentially be identified earlier and appropriate intervention can be initiated sooner. Unlike metallic IM nails, that create artifacts on MRI and CT, Carbon Fiber nails do not exhibit signal pile up or signal loss [4]. When viewing an MRI image of a patient with a metallic implant, significant signal loss and signal pile up is encountered if the implant is not parallel to the magnetic field. This impediment to visualization is avoided even when a carbon fiber implant is not parallel to the magnetic field [4].

Introduction
Carbon fiber is a versatile material that has unique biomechanical properties that make it an ideal material for internal fixation of osteotomies, arthrodesis sites, and fractures. Reported complications of internal fixation for arthrodesis and fracture fixation include nonunion, failure of fixation, and infection [1]. The Carbon Fibre “Piccolo” ankle arthrodesis nail, distal fibular plate, and one-third tubular plate possess many properties that may reduce the risk of complications.

Carbon fiber is radiolucent on plain film radiographs, allowing for unobscured views of cortical and cancellous bone on intraoperative and postoperative radiographs. This quality allows for enhanced visualization of arthrodesis surfaces and fracture sites and could aid in achievement of optimal positioning and alignment. It is proposed that enhanced visualization leads to less use of intraoperative fluoroscopy and a decrease in operative time [3]. Additionally, the unobscured view can potentially afford an accurate assessment of the progression of fusion or fracture healing during the postoperative course. Nonunions and delayed unions can potentially be identified earlier and appropriate intervention can be initiated sooner. Unlike metallic IM nails, that create artifacts on MRI and CT, Carbon Fiber nails do not exhibit signal pile up or signal loss [4]. When viewing an MRI image of a patient with a metallic implant, significant signal loss and signal pile up is encountered if the implant is not parallel to the magnetic field. This impediment to visualization is avoided even when a carbon fiber implant is not parallel to the magnetic field [4].

Carbon fiber possesses physical properties that make it compatible, if not superior, to implant alternatives composed of titanium and cobalt chrome. The CarboFix® “Piccolo” ankle arthrodesis nail has a similar modulus of elasticity to bone and has the ability to withstand prolonged fatigue strain [5]. The similar modulus of elasticity lessens stress shielding and allows for enhanced callous formation and stronger union [5]. It was demonstrated that carbon fiber has significantly less wear debris compared to titanium when wear debris was studied by Steinberg et al. Decreased debris theoretically decreases the risk of local tissue reaction and inflammation. Literature reveals the prevalence of metal allergy ranging from 2.7 to 9.4%. Currently, the majority of metallic joint implants contain nickel, chromium, cobalt-chromium and titanium-aluminum alloys. Allergic reactions to these components can manifest as dermatitis, impaired wound healing, joint effusions, pain, implant loosening and implant failure [6]. Carbon fiber has been shown to be inert and there are no current reports of allergic reaction [7].

This small, preliminary case series of carbon fiber fixation with short term follow up aims to stimulate further research on the use of this technology in the foot and ankle as well as other areas of the body.

Carbon Fiber Technology in TTC Arthrodesis
An unobscured view of trabeculation across the fusion site was evaluated in the postoperative period. However, the thickness of the plate is a disadvantage in foot and ankle procedures and did result in removal of the carbon fiber plate in one of the patients.

Carbon Fiber Technology in 1st Metatarsophalangeal Joint Arthrodesis
In a case series of TTC arthrodesis, the carbon fiber intramedullary nail was utilized for fixation with the modulus of elasticity being similar to bone, stable fixation was achieved without additional stress risers. The radiolucent property of the IM rod requires a precise...
three-dimensional visualization to achieve proper placement of the proximal and distal screws with the assistance of small radiopaque markers contained within the nail. The advantage of the radiolucent property was the ability to evaluate the fusion site with radiographs or CT. In a comparison of a CT traditional IM nail and a carbon fiber IM nail, there was no artifact obscuring the fusion site and it was clearly projected with the carbon fiber IM nail.

**DISCUSSION**

Carbon fiber technology has been used by orthopedic oncologists in the treatment of osteous tumors for years. Carbon fiber technology provides the surgeon with a unique and unobscured view of the underlying pathology or trauma. The carbon fiber reinforced polyethyleneethane (CPT – PEEK) allows for the use of MRI and CT with little to no artifact [1]. The modulus of elasticity of the Carbon Fiber technology is closer to that of bone than stainless steel or titanium [2]. The carbon fiber technology can be applied to the treatment of a myriad of pathologies in the foot and ankle, however, it is not without complications or difficulties. Some of the initial challenges are due to the characteristic radiolucency of the radiowave fluoroscopy, which leads to potential collision of cortical screws with the plate relative to the interfragmentary screws. This can be a challenge for blind screw placement especially with regard to the placement of cortical screws in close proximity to interfragmentary screws can be problematic. The difficulty is due to an inability to visualize the holes within the plate relative to the interfragmentary fixation. Even when looking on intraoperative fluoroscopy, this leads to potential collision of cortical screws with interfragmentary screws. In the case of intramedullary ankle arthrodesis [3], posterior subtalar arthodesis [4], and ankle surgery as well as other areas of the body. The cross-section of the carbon fiber implant in orthopedic trauma implants.

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