Case Review| Abdominal/Laparoscopy

Extensive Heterotopic Ossification in Large Incisional Ventral Hernia Requiring Transversus Abdominis Release

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Introduction/Background

Heterotopic ossification (HO) refers to the formation of ectopic bone in soft tissue1,2. This condition has been described as an atypical complication of burn injuries presenting in 0.2-4% of cases1,2. Factors such as total burn surface area, number of surgical interventions, amount of graft used and presence of sepsis have been associated to HO cases in the burn setting2. Usually HO develops surrounding long bones or joints after orthopedic procedures or trauma3. However, on extremely rare occasions, HO can develop from other bones such as the xiphoid. In this situation the calcified mass lodges in the surrounding abdominal wall and even intraperitoneal organs. In this scenario the ectopic bone acts as a foreign body causing discomfort, non-healing lesions, risk of infection, and complicating further surgical intervention4,5. Procedures such as abdominal wall hernia repair in these patients are complex due to the distorted anatomy encountered involvement of HO with the anterior sheath and rectus abdominis muscle5. The presence of HO in patients with ventral hernias is seldomly described in literature 5, thus knowledge gaps in the matter are still broad. To help address this gap, this paper describes a case of an open retromuscular abdominal wall reconstruction with bilateral transversus abdominis release (TAR) in a patient with extensive abdominal heterotopic ossification following a midline laparotomy in the setting of a large burn injury.

Summary

Patient is a 42-year-old male with a history of 55% TBSA second- and third-degree flame burns and cecal perforation status post exploratory laparotomy and right hemicolectomy. He presented with a 10 cm x 25 cm retromuscular ventral hernia and a 14.7 cm height x 5.2 cm length x 2.5 cm depth heterotrophic calcification that extended from the xyphoid process along the linea alba and beneath the rectus sheath. A complex ventral hernia repair with transversus abdominis release and synthetic mesh was performed after the HO was excised. Postoperative course significant for an infected wall hematoma treated with wash out and negative pressure therapy. Wound progressed well, and eventually underwent split thickness skin graft. At follow up wound is completely closed with no evidence of hernia recurrence.

Case Description

The patient is a 42-year-old man with a history of 55% TBSA second- and third-degree flame burns. His hospitalization course was complicated by ileus with cecal perforation which required exploratory laparotomy and right hemicolectomy. A temporary abdominal closure device was placed and he was subsequently closed. His postoperative course was complicated by bilateral lower extremity deep venous thrombosis with a saddle pulmonary embolism which was treated with an IVC filter and apixaban. Two years after the accident, he presented to our outpatient clinic for evaluation of an incisional hernia. His physical exam was significant for a BMI of 45 and a healed midline scar with a large mid-abdominal ventral incisional hernia (Figure 1). CT imaging demonstrated a large upper midline ventral hernia defect with herniation of small bowel and omental fat. The hernia width was 10 cm. Additionally, a dense 14.7 cm height x 5.2 cm length x 2.5 cm depth calcification that extended from the xiphoid process along the linea alba and beneath the rectus sheath was noted. After reaching a BMI of

less than 40 with dietary and lifestyle modification, he was scheduled for open abdominal wall reconstruction with possible transversus abdominus release and calcified soft tissue mass excision. His apixaban was held preoperatively for 3 days.

The abdomen was accessed through a midline incision made over the previous scar and carried down to the peritoneum. During this time a solid calcified soft tissue mass was noted in the soft tissue. The mass was completely dissected up to the xiphoid and then transected from the bone (Figure 2-3). Specimen was sent to pathology.

Attention was turned to the abdominal cavity. Dense adhesions to the anterior abdominal wall were released and the right retrorectus space was accessed through a medial incision over the right posterior rectus sheath. The retrorectus space was developed to the linea semilunaris. A top-down TAR was initiated by incising the posterior lamella of the internal oblique aponeurosis medial to the linea semilunaris and dividing the underlying transversus abdominis muscle fibers. The pretransversalis space was developed and carried downwards to the space of Bogros. The subxiphoid and subcostal retromuscular spaces were also developed. The left retromuscular space was developed in a similar manner. The posterior layer was reconstructed using 2-0 PDS in a running fashion. The final hernia defect size measured 10 cm wide and 25 cm long. A medium weight macroporous polypropylene mesh was selected for reinforcement of the repair. The retromuscular space measured 40 cm x 35 cm. The mesh was trimmed to size and placed in the retromuscular space. Two drains were placed in the retromuscular space. The linea alba was reconstructed using interrupted figure of 8 sutures with 0-PDS. A third 19 Fr Blake drain was placed in the subcutaneous space. Postoperatively, the patient had slow return of bowel function and PO tolerance and was discharged on postoperative day 7. All drains were removed prior to discharge.

Postoperative course was complicated by infected abdominal wall hematoma anterior to mesh noted on postoperative day 11 after patient presented with abdominal pain. Further laboratory work up and images conducted were concerning for infection given leukocytosis of 12.6 x103. Patient was taken to the operating room. During wound wash out it was noted that the anterior fascia had partially dehisced exposing the mesh. The mesh was noted to have good posterior incorporation and about 20% of total anterior surface exposed (Figure 4). Negative pressure wound therapy was applied (Figure 5). Patient was discharged home after tolerating PO intake. He then continued to follow up as outpatient. His wound progressed well, and eventually underwent split thickness skin graft from the thigh (Figure 6). Five weeks after the graft procedure he was seen in clinic. The graft had incorporated without issues and the abdominal wall was completely closed (Figure 7).

Discussion

Although the pathophysiology of HO is still unclear, a series of events that create a microenviroment prone to ossification have been described. The increase in vasodilation, growth factor accumulation, and cytokine deployment associated with soft tissue hypoxia result in migration of pluripotent cells and osteogenic precursors. As a response to injury these cells express properties that result in osteogenesis. The aim to preserve and rebuild injured tissue, especially after severe homeostatic disturbances such as those caused by burn injuries, creates the appropriate setting to develop HO. As explained, midline abdominal incisions associated to HO result from the osseous cells precursors accumulated in areas of major inflammation8.

Unfortunately, after suffering a burn injury the options to prevent and treat HO are quite limited. General preventive strategies include prophylactic NSAIDs and radiotherapy, however the safety and efficacy of these tactics are still unclear. For the majority of symptomatic cases, surgical excision is the mainstay of treatment.

While HO rarely develops in the abdomen, it often involves the xiphoid especially with a prior midline incision adjacent to the bone. This is supported by the handful of literature reporting abdominal ossification where xyphoid involvement is seen.

Even more infrequent is the presence of HO within an abdominal wall defect. Suleiman et Al. described the case of a male with a 13 cm ossified lesion after a midline laparotomy procedure 3 years prior. This patient underwent ventral hernia repair with anterior component separation and sublay Strattice. Although no recurrence was noted at 6 month follow up, the use of biologic mesh in ventral hernia repair has been associated with higher recurrence rates and up to 200x increase in cost with no difference in postoperative complications when compared to synthetic mesh.

Similarly, Akinbiyi et Al. reported the case of a 69 year-old male with HO involving the rectus fascia and bowel requiring ventral hernia repair with bilateral anterior component separation and local advancement flap of the anterior rectus sheath. In this situation the use of mesh was forgone likely due to the presence of multiple enterotomies. The use of mesh in patients undergoing ventral hernia repair has been associated with significant less recurrence up to ten years postoperatively when compared to primary repair. Even in the setting of contamination, synthetic mesh use has been described in single stage repair of contaminated ventral hernias and could potentially have been used to decrease recurrence in the long term. Despite this, no recurrence was noted at 18-month follow-up in this case.

To the best of our knowledge, our case is the first to describe the use of synthetic mesh and transversus abdominis release in a patient with a ventral incisional hernia associated with HO. This component separation technique was first described by Novitsky et al. and has been shown to provide greater anterior myofascial advancement when compared to anterior component separation. In addition, it decreases the need for lipocutaneous flap mobilization as the mesh is placed in a retromuscular position. Overall, posterior component separation has been associated with lower incidence of surgical site occurrence and surgical site infection when compared to anterior component separation.

We believe that our patient was at high risk for bleeding and infectious complications given his BMI and use of apixaban. He was severely symptomatic and was optimized prior to surgical intervention. Still, he developed an infected subcutaneous hematoma requiring surgical washout and negative pressure wound therapy. Despite this complication, the patient symptoms significantly improved and there were no signs of recurrence at nearly 6 months.

Since there are no established guidelines for patients with HO, learning about alternate strategies will expand the armamentarium of abdominal wall reconstruction surgeons in this challenging patient population.

Lessons Learned

Physicians performing abdominal wall repairs with HO should be familiar with transversus abdominis release and synthetic mesh as an option to avoid hernia recurrence and ensure ectopic bone excision.

Conclusion

This case report demonstrates that retromuscular ventral hernia repair with transversus abdominis release and synthetic mesh can be used in complex ventral hernia repair complicated by heterotopic ossification. Physicians performing abdominal wall repairs with HO should be familiar with this option to avoid hernia recurrence and ensure ectopic bone excision.

Case Review| Surgical Oncology

Diagnosis of Metastatic Gastric Adenocarcinoma on Routine Cholecystectomy

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Introduction/Background

Signet ring cell adenocarcinoma (SRCC) is a rare type of gastric adenocarcinoma with poor prognosis due to advanced stage at diagnosis. Despite the incidence of gastric cancer decreasing worldwide over the past few decades, the incidence of SRCC has been increasing. Generally, these tumors present at a much younger age and are linked to certain heritable genetic mutations, the most prominent of which is CDH1. In multiple retrospective reviews, less than 0.5% of routine cholecystectomies that underwent histology review revealed cancerous pathology.

Summary

We present a case of SRCC gastric adenocarcinoma with gallbladder metastasis initially diagnosed after laparoscopic cholecystectomy for acute cholecystitis. This is the first case report of this presentation in the literature.

Case Description

This is a 39-year-old male who presented with acute cholecystitis and underwent an uneventful cholecystectomy. Pathology revealed signet ring cell adenocarcinoma within the gallbladder wall that did not arise from the gallbladder mucosa, suggesting metastatic disease rather than primary gallbladder malignancy. His initial oncology clinic visit revealed supraclavicular and inguinal lymphadenopathy and a family history significant for renal cell carcinoma (RCC) in multiple first and second-degree relatives and pancreatic cancer in his grandmother. Imaging revealed a thickened gastric wall, pathologically enlarged lymph nodes in the supraclavicular, mesenteric, and iliac territories, and adrenal and bladder masses. EGD was significant for a malignant-appearing gastric ulcer, confirmed to be poorly differentiated SRCC by pathology. He is currently undergoing systemic therapy with FOLFOX and Nivolumab and has been deemed unresectable due to diffuse metastasis.

Discussion

SRCC is a rare and aggressive type of gastric adenocarcinoma. SRCC has many potential sites of metastasis, most frequently the peritoneum and bone, unlike standard gastric adenocarcinoma whose primary metastatic site is the liver. Our patient presented with characteristics typical of SRCC, like advanced stage at diagnosis with spread to multiple organs and lymph nodes and poor differentiation. To our knowledge this is the first reported case of detection after laparoscopic cholecystectomy for acute cholecystitis. Genetics are still pending, but a mutation is likely in light of his age and strong family history.

Lessons Learned

The importance of following up on pathology after surgery, assuring appropriate and timely referrals are made, a multidisciplinary and coordinated approach to patient care, and encouraging appropriate primary/secondary prevention to patients and families with a strong family history of cancer.

Conclusion

The gallbladder is a potential site of metastasis for gastric SRCC. It is important to distinguish between

malignancy arising from the gallbladder and malignancy metastatic to the gallbladder to correctly direct further evaluation and treatment.

Case Review| Trauma/Burn/Critical Care

Multistage Reconstruction Approach to Treat Complex Thoracic and Abdominal Wall Defect After Resuscitative Clamshell Thoracotomy and Laparotomy

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Introduction/Background

There are ~1000 resuscitative thoracotomies performed in the U.S. annually, with a mortality rate of 88-91% for penetrating thoracic injuries [1,2]. Patients who survive this extreme resuscitative intervention often experience prolonged recovery with significant life-threatening complications.

Summary

We report a case of a young male patient presenting to a Level I trauma center with multiple stab wounds who underwent resuscitative clamshell thoracotomy and emergency laparotomy, complicated by extensive chest wall and abdominal wall necrosis, requiring complex multistage reconstruction.

Case Description

The patient arrived via EMS intubated and hemodynamically unstable and was taken emergently to the operating room for exploratory laparotomy. Intraoperatively, the patient became pulseless and underwent extended anterior clamshell thoracotomy with restoration of pulses following evacuation of hemopericardium, hemothorax, and cardiac massage. The patient also sustained penetrating injuries to the diaphragm, spleen, and colon. Following initial resuscitation, progressive necrosis developed in the anterior chest wall below the 4th rib through the entire abdominal wall extending to the pubis and to the anterior axillary lines. After extensive serial debridement, the resulting anatomy included significant chest wall defect with exposed heart and lungs and absent abdominal wall. At this point, although palliative care and compassionate extubation was considered, the family decided to proceed with reconstruction attempt. The reconstruction steps included repair of the sternum, bilateral extended latissimus dorsi flaps and serratus anterior flaps, followed by serial microfracture of ribs, and split thickness skin graft to the entire chest and abdominal wall, while ongoing optimization of the patient's nutritional and physiologic condition were being carried out. The patient's recovery allowed him to be discharged at five months. At his 1-year follow-up, he reported full mobility, engagement in intensive physical activity, and no respiratory limitations.

Discussion

Based on existing survival statistics [3–8], combined with the severity of this patient's soft tissue loss and nutritional and physiologic compromise, the success of reconstructive efforts in this case was unknown. By applying principles of acute care surgery, critical care, and reconstructive surgery, this patient underwent a stepwise carefully planned reconstruction following a nearly universally fatal injury.

Lessons Learned

Extensive chest and abdominal wall necrosis is a challenging complication of resuscitative clamshell thoracotomy and emergency laparotomy. Complex chest and abdominal wall reconstruction can be accomplished successfully through a multidisciplinary stepwise approach.

Conclusion

This case demonstrates a potential treatment option for patients with significant tissue loss resulting in

complex defect of the chest and abdominal wall, whether due to trauma or other diagnoses including oncologic, infectious, or otherwise.

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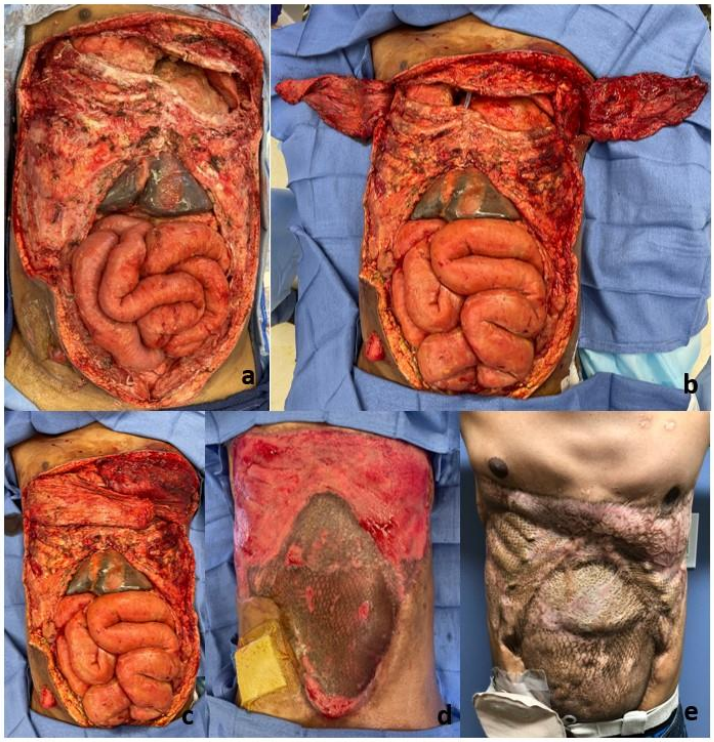

Figure 1: a) Wound following resuscitation and serial debridement. **b)** Flap elevation. **c)** Flap Inset. **d)** Wound following negative pressure wound therapy. **e)** 12-month discharge follow-up.

Case Review| General Surgery

Rapidly progressive and ultimately fatal necrotizing soft tissue infections with Clostridium sordellii

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Introduction/Background

Methodist Dallas Medical Center (MDMC) has seen several unusual cases of Clostridium sordellii necrotizing soft tissue infections (NSTI). All cases have resulted in rapid clinical deterioration leading to death. As an uncommon cause of NSTI, we report the clinical picture and progression of disease in four patients with Clostridial soft tissue infections seen at MDMC over the course of several months.

Summary

MDMC saw a cluster of C. sordellii-associated necrotizing soft tissue infections in short succession. Clinical presentation, course, and outcomes were remarkably similar in all four cases. All patients died. Aggressive medical and surgical management are essential to survival.

Case Description

All patients presented afebrile with normal vital signs aside from mild tachycardia. All patients reported recent intravenous drug use. White blood cell (WBC) counts at presentation were 28,000-42,000/uL, and all patients were found to be hyponatremic (124-128 mmol/L). All patients were started on appropriate antibiotics within 2 hours of emergency department (ED) arrival. All four underwent urgent surgical debridement of infected tissue. All patients worsened clinically over the following 24 hours despite aggressive measures. Postoperatively, the patients decompensated with more tachycardia, worsening soft tissue edema, and profound hemoconcentration. WBC counts increased to as high as 141,000/uL. Worsening acidosis was also noted in all patients. All but one patient was taken back to the operating room for second debridement. All four patients continued to deteriorate despite aggressive surgical and medical management. Death occurred in all four patients within 60 hours of presentation to the ED.

Discussion

These four cases of C. sordellii related NSTI were uniformly fatal at MDMC. Early recognition, aggressive medical and surgical management, and intensive care unit monitoring for signs of decompensation are paramount to survival in these patients. Prior studies have demonstrated particularly virulent, clonal strains of C. perfringens and C. sordellii present in unrelated patients within a geographic location in prior outbreaks. Authors suspect these strains may come from a common batch of bad heroin. There may also be a role for public health notifications for C. sordellii outbreaks to minimize additional infections.

Lessons Learned

Diagnosis and treatment of patients with suspected Clostridial NSTI is a surgical emergency. ED presentation and surgical consultation were delayed in several patients. Raising awareness among all physicians for expedited diagnosis and treatment may improve patient survival.

Conclusion

Clostridium sordellii is a rare cause of aggressive NSTI. Patients are classically afebrile, tachycardic, and hypotensive with characteristic leukemoid reaction, hemo-concentration, and hyponatremia. Patients

decompensate rapidly. Mortality has been reported as high as 70%. Appropriate antibiotic coverage and aggressive surgical debridement are essential to improve the chances for survival.

Case Review| Pediatric Surgery

Migration of a Braces Wire Through the Foramen Ovale into the Temporal Lobe: A Case Report

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Introduction/Background

Migration of objects into the cranial vault from orthodontic procedures is difficult to achieve due to the nature of the base of the skull and the obstacles it provides and consequently is a rare complication.

The structures that run through the foramen ovale are the mandibular branch of the trigeminal nerve, accessory branch of the middle meningeal artery, lesser petrosal nerve, and small emissary veins. An injury to the foramen ovale could result in an injury to any of these important structures. A penetrating injury of the foramen ovale, if advanced over 10 mm past the foramen, could also lead to injury of the abducens nerve, cavernous sinus, or internal carotid artery.

A longitudinal study on patients with traumas to the brain showed that patients with hemorrhages localized to the temporal lobe were at higher risk of developing early seizures and post traumatic epilepsy. The patients who do develop post-traumatic epilepsy, are also at greater risk for chronic temporal lobe atrophy and worse functional outcomes long term.

Summary

This is a case report of a 12-year-old male presenting with seizures and behavioral changes secondary to migration of braces wire through the foramen ovale into the left temporal lobe after braces adjustment. The patient had an intraparenchymal hematoma that was stable after removal of the wire under sedation and paralysis. Patient had possible gelastic seizures at his follow up visit and recurrent headaches, with MRI showing signs of slow resolution of the hematoma.

Case Description

The patient was a 12-year-old male with no past medical history or contributory family history.

The patient had his braces placed by an orthodontist. He noted soreness in his left cheek and the feeling that he was being poked. The patient returned for adjustments to the braces twice and was prescribed antibiotics during one of the visits due to left cheek swelling and a presumed gland infection. He had been on antibiotics for two weeks when he began experiencing nausea, vomiting, behavioral changes, and seizures. His parents took him to the emergency department where a computed tomography (CT) scan of the head reported a foreign body in the left hemisphere with subarachnoid hemorrhage. Pt was intubated, given midazolam for seizures, and transferred to our facility for a higher level of care.

Upon arrival the patient underwent direct laryngoscopy, chest x-ray, cranial x-ray, CT head/neck angiography, CT head without contrast, and electroencephalogram (EEG). This testing showed that there was a curvilinear hyperdensity leaving the left mandible and traveling superiorly into the infratemporal fossa and left foramen ovale terminating in the left middle cranial fossa with associated anterior temporal lobe hematoma. This hematoma was presumed to be the result of perforation of a venous structure in the floor of the middle cranial fossa. There was no evidence of active extravasation or arterial injury. EEG showed focal slow activity maximally in the left temporal lobe consistent with local trauma but no seizure discharges during evaluation. Direct laryngoscopy found no active bleeding and the wire was visualized entering the left posterior mandible.

The braces wire was removed under sedation and paralysis on the day of arrival and head CT after removal showed no change in the hematoma. The patient was given 2000 mg intravenous (IV) levetiracetam on the day of arrival and continued on 600 mg IV levetiracetam twice a day (BID) for the rest of his stay and IV dexamethasone with gastrointestinal (GI) prophylaxis. He was also started on IV vancomycin, IV metronidazole, and IV ceftriaxone for the risk of abscess due to the exposure of the brain to the oral flora. He was extubated on the night of arrival. On hospital day 2, he followed commands but did not verbalize and was disoriented to place and time. The rest of his neurological exam was normal.

On hospital day 3, the patient underwent magnetic resonance imaging (MRI) with and without that showed a stable intraparenchymal hematoma in the left anterior temporal lobe with surrounding vasogenic edema. On this day the patient was awake, alert, and oriented with complaints of mild dizziness, headaches, and blurry vision. On hospital day 4, the patient's headaches were well controlled and he had a normal neurological exam. He was able to be discharged home with oral (PO) metronidazole, PO levofloxacin, and levetiracetam oral solution to continue at 600 mg BID.

Ten days after discharge, the patient returned for his pediatric neurosurgery follow up and repeat MRI. The patient had complaints of recurrent focal left temporal headaches rated a 4/10 and seizures. His parents described these seizures as sudden and unwarranted laughter that lasts for a few minutes at a time. This description was concerning for gelastic seizures, which are characterized by bursts of laughter[5]. These events started two days prior to follow up. Parents confirmed compliance with administering the levetiracetam BID. Patient was recommended to follow up with pediatric neurology. The MRI showed slight improvement in the vasogenic edema and left temporal lobe hematoma. Patient would follow up in 6 weeks for another repeat MRI and parents had no other concerns.

Discussion

This case is a rare complication of orthodontic work. There is a long course that an object has to travel from the oral cavity to terminate in the temporal lobe and many important structures that can be damaged along the way, including important nerves and vasculature. Damage to the mandibular branch of the trigeminal nerve could result in dysfunction of the jaw leading to temporomandibular joint dysfunction (TMD), trigeminal neuralgia, or ear pain. Vasculature damage, such as to the accessory branch of the middle meningeal artery, small emissary veins, cavernous sinus, or internal carotid artery would result in further intracranial bleeding. Lesser petrosal nerve damage would result in impaired parasympathetic functioning to the parotid gland leading to impaired salivation. Damage to the abducens nerve would lead to abducens nerve palsy which presents as loss of ipsilateral eye abduction causing horizontal diplopia. This patient avoided these extra complications. He was able to have his wire removed without having to undergo surgery and with relief in most of his symptoms.

The patient was continuing to experience headaches in follow up, even though his hematoma was improving it was still present. The patient was also experiencing seizures, potentially gelastic seizures, in the days leading up to his first follow up appointment. There has been evidence that temporal lobe trauma leads to increased incidence of early seizures which could be transient or long term. The seizures that the patient was exhibiting at follow up will need to be followed by a pediatric neurologist as they could continue long term or evolve into post-traumatic epilepsy.

Lessons Learned

In this case, we learned about the potential short term and long term consequences of a foreign body entering the temporal lobe, the ways in which it could occur, how to diagnose, and how to treat it.

Conclusion

In conclusion, the case examined a 12-year-old male who sustained an intraparenchymal hematoma to the anterior temporal lobe secondary to migration of a braces wire through the foramen ovale following wire adjustment. The wire did not cause damage to any nerves, arteries, or large venous structures. This patient remained stable through his hospital stay but upon follow up is continuing to have seizures and localized left temporal headaches. This case is a rare complication of orthodontic work and could lead to long term effects.

Case Review| Trauma/Burn/Critical Care

Autologous keratinocyte suspension in the treatment of partial-thickness hand burns, a case series

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Introduction/Background

One difficult location for burn care historically has been the hands. While the hands cover a small surface area of the body, they are the most commonly burned location. Operative technique for deep 2nd and 3rd degree hand burns has remained sheeted or 1:1 meshed split thickness skin grafting (STSG) with subsequent postoperative immobilization. However, high rates of contracture and decreased postoperative range of motion (ROM) are common complications of this technique. Thicker grafts to the hand, as opposed to thin, high ratio meshed grafts, result in improved healing times and functionality with lower contracture rates and improved postoperative ROM. One novel technology is spray-on autologous keratinocyte solutions (AKS), which is composed of a patient's own harvested fibroblasts, keratinocytes, and melanocytes. AKS has been shown to improve healing and operation times, decrease pain, and possibly improve postoperative complications such as symptomatic scarring.

Summary

Our case involves the use of AKS application to four patients with deep 2nd and/or 3rd degree burns to bilateral hands. We investigated whether excision and STSG with AKS application can provide an alternative treatment to increase healing of the hand and mobility of the joints. We found that the use of AKS in conjunction with STSG allowed earlier initiation of ROM exercises of the hand.

Case Description

We present four patients with deep 2nd and/or 3rd degree burns to the bilateral hands treated with either a 1:1 or 1:2 ratio meshed STSG with subsequent AKS application. After consent was obtained, the postoperative course of four patients who underwent STSG with AKS application for their 2nd and/or 3rd degree hand burns was analyzed. Factors such as range of motion at discharge, time to healing, and occupational therapy documentation were used to interpret success of STSG in conjunction with AKS. The four patients, all male and aged 30 to 67 years old, underwent excision and grafting of hands as well as subsequent AKS application. All patients were able to initiate OT ROM exercises of their hands starting on postoperative day 4 at graft take down. All were discharged with full range of motion with near complete healing of their burns.

Discussion

The use of AKS in burn care has been increasing. AKS has been shown to decrease hospital length of stay, increase epithelialization, and decrease healing times associated with 2nd and 3rd degree burn wounds. Treatment of hand burns is a difficulty faced by many burn and plastic surgeons with the most common complication being scar contracture. This complication can be debilitating to the patient when scarring spans joints in the hand.

Lessons Learned

AKS in conjunction with STSG may allow for quicker healing and allow for earlier, more aggressive inpatient ROM exercises.

Conclusion

We believe that the use of STSG in conjunction with AKS on hand burns results in improved outcomes by decreasing healing time and leading to improved mobility.