Chemotherapy Complicating Wound Healing After Amputation
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Abstract
The predicted treatment plan for a below knee amputation was complicated due to the patient concurrently receiving chemotherapy for myxoid synovial sarcoma. Due to the patient receiving chemotherapy in the immediate postoperative period surrounding the amputation, the wound suffered multiple occurrences of dehiscence requiring negative pressure wound therapy (NPWT), and irrigation and debridement. Through teamwork and care coordination between Oncology and Orthopedics, the patient’s wound eventually healed. He has since been fitted for a prosthesis and is well on his way to reaching his goal of playing basketball again.

Case History
16-year-old African-American male patient presented to a Pediatric Orthopedic Surgery clinic regarding a “lump” posterior to his right lateral malleolus.
- Differential diagnoses: ganglion cyst, lymphedema and neoplasm
- Diagnostic testing: ultrasound, MRI and direct biopsy
- Final diagnosis: myxoid synovial sarcoma grade 2 of the right ankle.
- Treatment: antineoplastic chemotherapy and a below knee amputation.

Chemotherapy Course
Children’s Oncology Group Protocol ARST1321: Regimen A without Pazopanib.
- 6 cycles of chemotherapy over 19 weeks
  - Ifosfamide
  - Doxorubicin
- Induction Chemotherapy started 6 weeks after definitive diagnosis
- Surgery during Week 7 of protocol
  - Right below knee amputation with extended posterior flap

Postoperative Course after Right Below Knee Amputation
- 3 weeks Post-Op: Chemotherapy cycle 4 administered per protocol
  - Slight anteromedial and anterolateral wound dehiscence present with minimal serosanguineous drainage
- 7 days Post-Chemo: Seen in Orthopedic clinic for post-operative wound check
  - Continued anterior wound dehiscence
  - Nonpurulent, fibrinous drainage
  - Need for hospitalization due to infection risk discussed with patient’s mother
    - Family unable to be admitted on this day due to mother’s job constraints
  - Patient to return to Orthopedic clinic in 5 days for repeat examination
- 10 days Post-Chemo: Readmission (6 day stay)
  - Admitted through ED with fever, purulent wound drainage and moderate dehiscence
  - Went to OR for irrigation and debridement with NPWT
  - Hospital Day #3: Return to OR for repeat irrigation and debridement with NPWT
  - Hospital Day #6: Discharge day
    - Return to OR for repeat irrigation and debridement with primary wound closure
- 7 weeks Post-Op: Chemotherapy cycle 5 administered; no drainage or dehiscence

Prevalence Data for Soft Tissue Sarcomas (STS)
- Comprise 8-10% of all childhood malignancies yearly
  - At least 500 children under age 20 in the United States
- Survival rates:
  - Low-risk: excellent
  - Intermediate-risk: 50%
  - High-risk: 15%
- Synovial sarcomas are nonrhabdomyosarcomas (NRSTS)

Literature Review
- Few prospective studies have been conducted regarding management of pediatric NRSTS
- Most common primary tumor site is lower extremity
- Ifosfamide and doxorubicin (ID) are considered standard of care for NRSTS
  - Most active and most commonly used regimen
  - No clearly superior regimen has been defined
- Response rate to chemotherapy ranges from 35-56%
- Physiologic process of wound healing is impaired and prolonged with chemotherapy
  - Agents initiate inflammatory arrest, suppress protein synthesis, and inhibit cell replication
  - Healing is especially impaired when neutropenic with <500 granulocytes/µl
- Therapeutic approach for intermediate- and high-risk disease may include a multitargeted tyrosine kinase inhibitor (TKI)
  - TKIs disrupt the tumor angiogenesis needed to grow and metastasize

Resultant Process Changes
- Patient will be discussed at a multidisciplinary Tumor Board immediately upon diagnosis and at least once after amputation has been performed
- Per these discussions, it was determined that going forward:
  - Instead of a primary wound closure at the end of the surgical case, alternative closure options (i.e. drains, NPWT, etc.) may be used to facilitate wound healing on a case-by-case basis
  - Chemotherapy can then be administered sooner post-operatively as complete healing can often not be waited for due to the necessitated intensity of chemotherapy
  - Oncology provider to Orthopedic provider discussions will be held regarding status of wound healing after each respective post-operative clinic visit

References