

“Lung Sandwich”: Use of a De-epithelialized TRAM Flap, Partial Latissimus Dorsi Flap, and Dermal Patch to Surround and Reconstruct Coccidioidomycosis-induced Bronchopleural Fistula

Shawn Moshrefi BS

Rishi Agarwal MD

Kevin Broder MD

Richard Bodor MD

University of California, San Diego

VA Medical Center – San Diego

Nothing to disclose

Case Presentation

- Previously healthy 38 year old male underground pipeworker
- New persistent cough, malaise, and worsening dyspnea
- Failed outpatient treatments and antibiotic therapy
- Spontaneous pneumothorax
- Pneumonia → empyema despite antimicrobials
- *Coccidioides immitis* final cultures
- Chest tubes fail, scarring and persisting air leaks
- Thoractomy procedures from outside institution failed
- Subsequent chronic bronchopleural fistula

Case Presentation, Continued

- For one year, he remained with persisting empyema and bronchopleural fistula
- Developed severe cachexia and was severely dyspneic
- Chest tube dependent for over a year
- CT surgeons at our institution planned for an Eloesser flap or pneumonectomy as last salvage options
- Plastic Surgery consulted for salvage to help to avoid morbidity of pneumonectomy in this infected setting

Surgical Considerations and Limitations

- Latissimus dorsi flap: was cut short and scarred down
- Serratus anterior flap: was scarred with transected pedicle
- Chronically chest tube dependent; therefore any recon options were subject to repeated barotrauma
- Chronically infected wound recalcitrant to broad spectrum antimicrobials, high risk of post-operative infection
- Cachectic patient; refusing Keofeeds
- Lung defects and leaks were diffuse, deep, and out of reach of standard workhorse flaps
- Patient sick, weakened, and refused free flap options

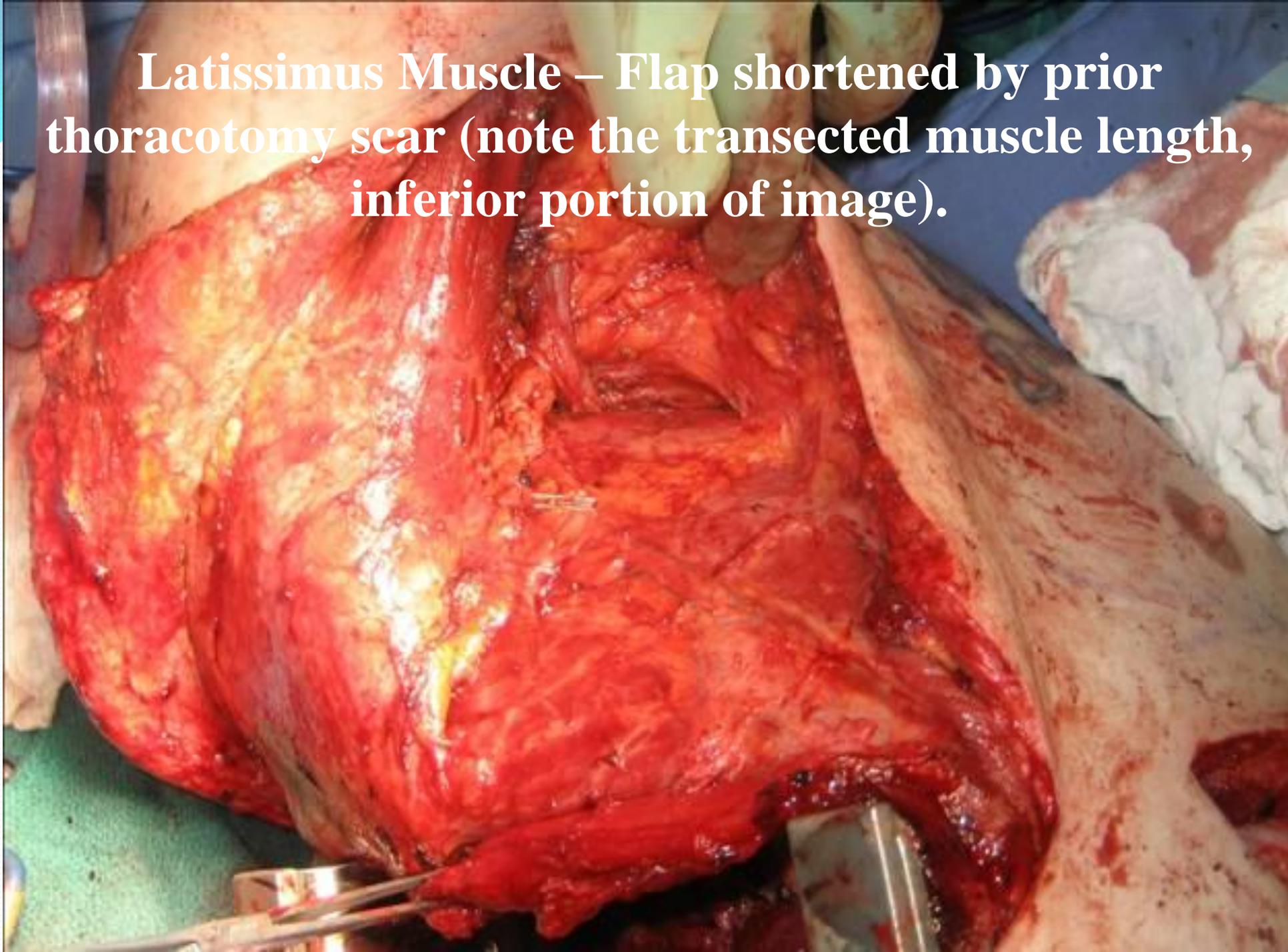
The Reconstruction

- CT surgery removed ribs and opened direct access tunnels allowing placement of de-epithelialized TRAM, under the lung, delivered efficiently and coming from below
- Latissimus dorsi remnant flap was islanded on its pedicle and utilized to “sandwich” the lung, coming from above
- Autologous dermal patch harvested as a graft, to oversee the identified lung pleural defect
- Acellular dermal matrix used to reinforce abdominal TRAM donor site

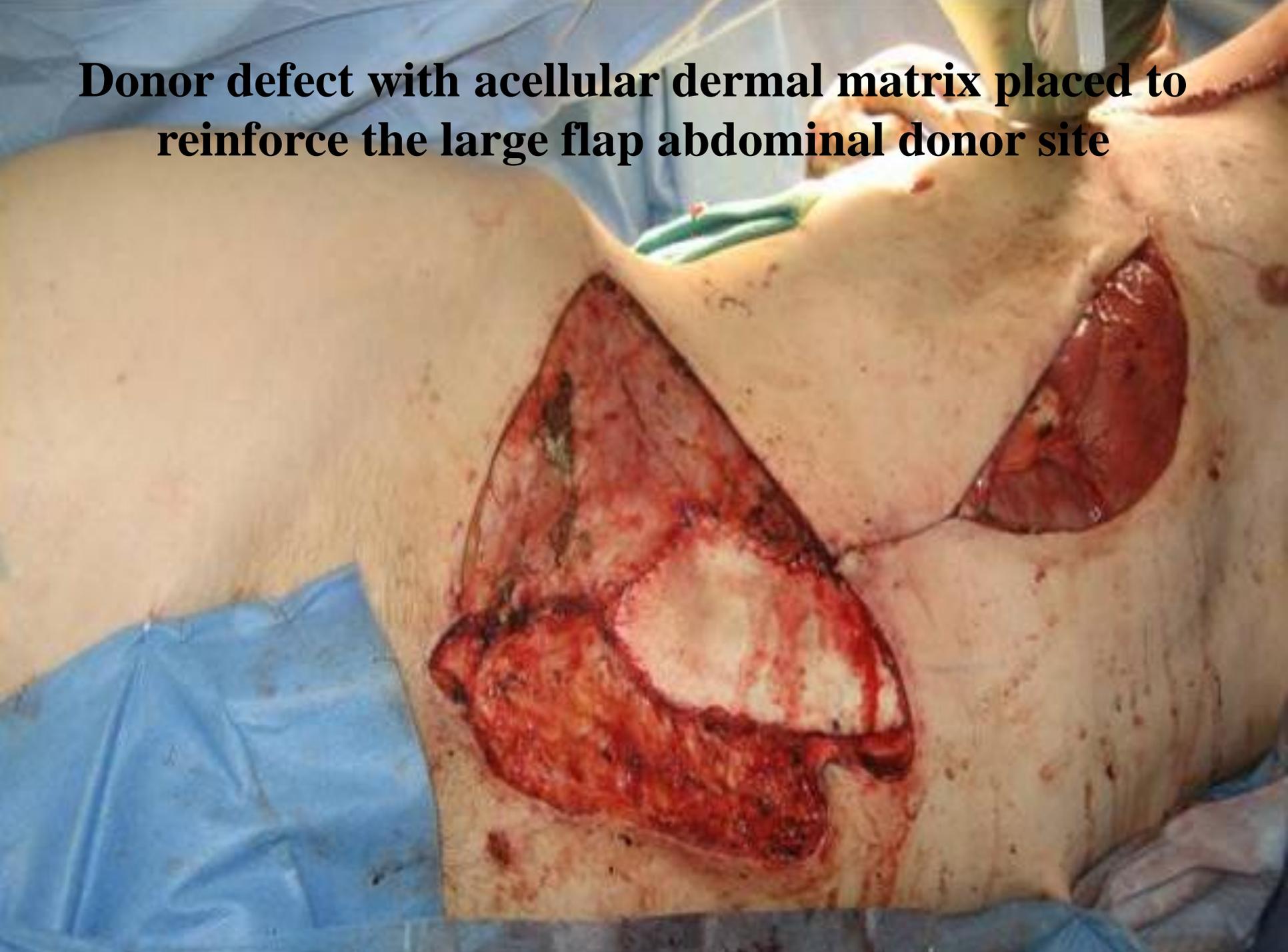
The Reconstruction Cont'd

- Interventional Pulmonology placed an endobronchial valve
 - Goal: to temporarily reduce barotrauma to the healing flaps and dermal patch while allowing undisturbed healing and sealing of injured lung parenchyma
- Split-thickness skin graft (STSG) later was placed onto his abdominal donor wounds, after adequate granulation developed over the allograft tissue matrix mesh.

Latissimus Muscle – Flap shortened by prior thoracotomy scar (note the transected muscle length, inferior portion of image).



Donor defect with acellular dermal matrix placed to reinforce the large flap abdominal donor site



Pre-operative CT Thorax demonstrating multiple air pockets from pneumothorax (demonstrated by red stars). Chronic thickening of pleural surfaces inhibited re-inflation of the lung, contributing to the prolonged chest tube failure.



3 weeks postoperatively, CT Thorax already demonstrating improved thoracic space coverage with only minor residual air pocket (red star).



1.5 years post-op CT Thorax demonstrating complete thoracic space filling by flaps (red star) and no further pneumothorax. Density of the tissue is consistent with fibrofatty substance, given maturation of a denervated muscle flap that has stabilized and healed.



Case is a Series of Rare Events:

- ID standpoint = Rare. *Coccidioides immitis* empyema uncommon.
 - A 10 year extensive review identified a total of 1496 cases of Coccidioidomycosis only 0.468% of which developed effusion, pneumothorax, or empyema
- Endobronchial valve as used = Rare for infection reasons
- CT Surgery standpoint = Rare presentation
 - Empyema so recalcitrant in a young healthy patient progressing towards pneumonectomy is very rare
- Plastic Surgery Presentation = Rare
 - Difficult combination : being left with scarred and shortened flaps, dermal grafts, and having to “sandwich” the otherwise condemned lung (via direct chest access tunnels for maximal reach)

The Outcome

- Chest tube removed just days after surgery (after over one year of chest tube dependence prior to the flap surgery)
- Recovered rapidly with no further cachexia (having soon regained his 50 lbs of lost weight and muscle)
- Chest wall defect and air leaks rapidly resolved, and apical dead space durably improved, just days later
- Long Term Results: Surgical site cultures and blood titers no longer showed microbial infection
- Patient since has returned to working full time without restrictions

Stable wound healing from donor flaps, acellular dermal matrix, and skin grafts



Conclusion: Teamwork Was Vital

- Each multidisciplinary team member brought their own specialty's unique and vital contributions to the treatment table, thus resulting in a successful cure in this rare clinical presentation
- Such multi-specialty collaboration was monumental in the salvage of the patient's lung in this exceedingly morbid, progressive, and unusual presentation in a healthy young man.