**Situation:** Applying a traction splint to a patient with a suspected femur fracture is not a trivial decision. Effective application and monitoring of a traction splint is technically challenging and a highly perishable skill. Managing a patient with a traction splint in place is also challenging – particularly so in the setting of a technical rescue. The evolution of commercially available traction splints is shallow when considering use in a rescue or backcountry environment. SAR professionals need knowledge, skills, and equipment to effectively manage femur fractures.

**Background:** The femur is the largest, strongest, long-bone in humans. Fractures occur from the proximal “surgical” neck (often seen as “hip fractures” in the elderly), anywhere along the shaft, and distal into the lateral and medial epicondyle.

Most traumatic femur fractures happen in the middle shaft region as a result of high energy mechanisms ie: long falls, high speed motor vehicle crashes, high velocity or large mass projectiles, explosions, and crush type mechanisms (rodeo and industrial settings for example). Potential for high energy mechanisms exist in the backcountry setting as well such as rock climbing falls, rock fall while caving, falls and avalanches while mountaineering, skiing big lines, whitewater mishaps, etc. Fortunately, the incidence of femur fractures is lower among outdoor professionals and recreationalists (not the focus of this presentation).
The current curriculum taught by the National Registry of Emergency Medical Technicians (NREMT), Tactical Combat Casualty Care (TCCC) and Advanced Trauma Life Support (ATLS) encourages the use of traction splints to manage mid shaft femur fractures. Their curriculum is based mainly off data from battlefield medicine. Despite the long history of use, in both military and civilian prehospital care, surprisingly little recent outcomes data are available on the use of traction splints. Far smaller still is the subset of data related to the use of traction splints in rescue or backcountry settings (not the focus of this presentation).

**Assessment:** Due to the dearth of supporting data, relatively low frequency, potential for increased morbidity, and highly technical nature of femur traction splinting, several outdoor education and wilderness medicine schools are dropping traction splints from their curriculum. Front-country (urban based) first responder and EMT training provides limited exposure and practice time for assessing and treating femur fractures. Further, urban EMS training does not fully address the particular challenges imposed in technical and backcountry rescue. Newer SAR members and some seasoned professionals are lacking in ability to effectively manage femur fractures in an austere environment.

We know from sad experience that patients often arrive at the ED with traction splints poorly or incorrectly applied, and the splint is doing no good whatsoever, and may be causing harm. We have many anecdotes to support the use of traction splints (when applied correctly) for patient comfort. However, we recognize the pitfalls and challenges which may be overwhelming when compared to the gains in patient comfort (topic for future study?).

**Recommendations:**
We recommend a rigorous in-house training program for all EMS and SAR members which includes performing a thorough focused patient assessment, using judgment as to how to effectively manage the suspected fracture, and skills practice (classroom and scenario based) to ensure competency using the available equipment.

**The problem addressed here:**
The common commercial traction splints (Hare, Sager, Kendrick and others) carried on most North American ambulances, rescue trucks, and in SAR and ski patrol jump packs, all employ some type of mechanism for applying longitudinal mechanical tension (traction) to the femur by pulling from the ankle. Typically this mechanism extends well beyond the patient's foot. While these splints may provide effective traction (not the focus of this presentation), the part of the splint which extends beyond the foot is highly problematic in a rescue situation. The most obvious, annoying, and unsafe problems are:

- The patient cannot be placed into a sleeping bag without cutting a hole, or opening, and leaving open a zipper at the foot. This makes it more difficult to keep the patient warm.
- The splint extends past, and often makes contact with, the foot end of the litter or stretcher. This results in the splint getting bumped, tripped over, and snagged which certainly causes increased pain, and may further injure the patient.
Many rescue and transport aircraft (AS-B3 for example) utilize a stretcher system which places the patient's feet in very close proximity to the front bubble and ventilation systems. This splint extension makes loading and transporting difficult if not impossible, often resulting in the flight team choosing to remove the splint entirely.

**Our solution:** The Slishman Traction Splint (STS) utilizes an internal mechanical advantage system which allows for the longitudinal pull to be directed from above (proximal to) the ankle thus eliminating the need for any portion of the splint to extend beyond the patient’s foot. The Kendrick Traction Device (KTD) can be applied in a “reversed” fashion to accomplish the same result.

Many EMS units currently carry the KTD. We feel this application modification using the STS concept with the KTD, “KTD Reversal”, will reduce rescuer frustration and increase patient safety. Rescuers may be more likely place a traction splint where indicated, and the splint placed in this configuration can remain in place throughout the rescue and transport.

**Studies and papers referenced for this presentation:**

- **Evaluation of Commercially Available Traction Splints for Battlefield Use** 7/2014  
  Nicholas M. Studer, MD, EMT-P; Seth M. Grubb, BS;  
  Gregory T. Horn, MD; Paul D. Danielson, MD, FACS, FAAP  

- **A comparison between the effects of simple and traction splints on pain intensity in patients with femur fractures**  
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- **A Descriptive Analysis of Traction Splint Utilization and IV Analgesia by Emergency Medical Services.**  

- **Femur Fracture Immobilization with Traction Splints in Multisystem Trauma Patients**  
  Prehospital Emergency Care 7(2):241-243 · January 2003  
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**Disclosures:** Lance Taysom is not affiliated with and did not receive compensation from any splint manufacturer or commercial entity referenced in this paper. Lance works as a Flight Nurse/Paramedic for Air Methods Corporation, teaches Wilderness Medicine for NOLS and is a volunteer SAR team member for Bannock County, Idaho and the Denali Rangers in Denali National Park, Alaska. None of these organizations are sponsors for this presentation. I welcome your questions or feedback. Thank You

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