

## Tips on Basic Extremity Fracture Management

By Melissa Ludwig, MD, FACEP

A little bit of medical knowledge can go a long way – especially at sea, where injuries that are left untreated can sometimes pose limb- or even life-threatening complications. In this case, an MAS client contacted the Global Response Center for medical advice regarding a serious leg injury. The injured crewmember, an otherwise healthy 35-year-old man, was using a pipe bender, when the machine misfired, and a length of steel pipe struck his right lower leg just below the knee. His cry for help brought the Chief Officer to the scene who saw that the man was suffering from an obvious deformity of the lower leg, likely an open tibia/fibula bone fracture.



*Deformity of lower leg with bleeding, likely an open tibia/fibula fracture.*

Located in the Indian Ocean, the vessel had no access to nearby medical care and the estimated arrival to next port of call was three days. This case illustrates a scary predicament for even seasoned masters and medical officers: a serious and potentially limb-threatening medical emergency on board, a crewmember in considerable pain and the vessel in a remote environment, out of range of immediate shoreside medical assistance. A few helpful medical tips, however, can assist crews in effectively managing similar situations on board and also ensure the crewmember receives the best care and management until shoreside arrival.

### **Understanding and Assessing Fractures**

Orthopedic injuries, including fractures and broken bones, can be classified in a variety of ways. In this case, a critical feature is whether a fracture is open or closed. Open fractures don't necessarily mean that a bone is protruding from the skin. Rather, an open fracture refers to skin or internal soft tissue over the fracture site that is broken or penetrated. In either case, a person can be at risk for infection and healing complications. Open fracture incidents involving large bones, like the tibia, are generally considered a full-scale orthopedic emergency.

When assessing a fracture, the first step is to establish whether the blood supply or nearby nerves are compromised. Damage to blood vessels and nerves is especially common in fractures where an obvious deformity of the limb exists. Often the sharp edge of a broken bone can impinge on or lacerate blood vessels and nerves as well as other nearby internal structures.

Always feel for pulses downstream of the fracture site. A good guide may be to check what a normal pulse feels like in the unaffected extremity or in an uninjured crewmember. Pulses should be palpable through the skin on the top of the foot and on the inner ankle in lower leg fractures, as in the case above. It is a good idea to mark the pulse with an "X" in ball point pen on the skin so that it can be checked frequently.

Other things to consider are skin temperature and color. The extremity should be warm and pink – the same as the uninjured side. Cool and very white or bluish colored skin can be an indication of interrupted blood supply. Although pain will be present due to the broken bone, increasing pain is common in a limb with poor or no blood supply.



*Check for a pulse downstream from the fracture site.*

### ***Treating the Fracture***

Initial onboard treatment of fractures like this one include rinsing the skin wound with an antiseptic, such as Providine iodine solution, followed by a sterile liquid, like normal saline or water. Apply a clean, sterile gauze dressing to completely cover the open skin area.

Antibiotics should also be started immediately, preferably by an intravenous line or if not available, then orally. It is advisable to seek radio medical advice to best determine which antibiotic to use, as well as dosage recommendations.

Because compromised blood supply or nerve compression can be a limb-threatening emergency, prompt recognition is critical. In such situations, a traction splint and/or a repositioning of the injured limb is vital. A traction splint may be used to ease the pressure on blood vessels and nerves and to reestablish blood flow to the injured extremity. Traction splints also help to align the broken fragments, thereby reducing pain and damage to nearby blood vessels and nerves. It's important to note that a dressing should cover the wound prior to securing the traction apparatus. It is also a good idea to practice using the traction splint apparatus during monthly drills, so that crew can be prepared for an actual emergency. In this situation, a traction splint with 5 -10 kilograms of traction was applied by the mate and captain.



*Application of external splint and traction.*

Finally, and perhaps most importantly, the injured person's pain must be addressed. Before dispensing any medication, it is highly recommended to seek radio medical advice to best determine dosage and medication type before dispensing. When speaking with the doctor, quickly describe the crewmember's medical history, including current medications and allergies. Although intravenous medications are most effective, intramuscular or oral pain medications can be used.

Due to the painful nature of fractured bones – especially displaced fractures – strong, narcotic pain medications are most often recommended. Morphine sulfate and Nalbuphine can be given intravenously or intramuscularly. Codeine, Acetaminophen/Hydrocodone and Oxycodone can be given orally as well. For less severe pain, Ibuprofen, Naproxen, Acetaminophen or Tramadol can be used orally – or Ketorolac as an intravenous or intramuscular injection.

### ***Shoreside Treatment***

People with extremity fractures will require shoreside medical care with x-ray capability and qualified physicians. A crew's ability to assist from the onset of the injury, however, can be critical to avoiding potential limb loss and complications. In the case of large-bone open fractures, an orthopedic surgeon may need to realign and stabilize the fracture. In other cases, the injury can be realigned or set with plaster casting. The recovery period is typically six to eight weeks and will require follow up with the treating physician.

### ***About the Author***

As a practicing emergency physician in metropolitan Phoenix, Arizona, and a medical advisor for MAS, a service of MedAire, Dr. Melissa Ludwig has over 10 years of experience as a cruise ship physician, and is currently involved in handling medical emergencies daily in an urban emergency room, as well as remotely via MAS' venues.