

RECENT CONSIDERATIONS IN TACTICAL MEDICINE

By Stephen Rush, MD

Equipment, technology, protocols and thinking are always evolving in medicine. Nowhere has this been more evident than in tactical medicine in the past 10 years. The introduction and validation of Tactical Combat Casualty Care (TCCC) have been elevated in the past decade from an empiric approach to evidence-based medicine.¹ Even in TCCC, the introduction of the use of the combat-ready clamp, tranexamic acid (TXA), and ketamine reflects the evolution in thinking and experience in Operation Enduring Freedom and Operation Iraqi Freedom, which will impact civilian prehospital and emergency care in the coming years.

These experiences can also impact domestic tactical medicine, civil search and rescue efforts, planning and training for disaster response and mass casualty events, as well as any care required in remote and hostile environments.

The purpose of this article is to share some of the evolution in training, techniques and equipment that has taken place in the U.S. Air Force pararescue community over the past few years. Although some of the issues are relatively basic, the formalization and standardization of concepts and principles lead to improved care by not missing the basics.

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MARCH/H PAWS

Traditional emergency care begins with the ABCs. We have expanded the approach to field medicine of using the mnemonic MARCH, or MARCH-pain-wounds, to MARCH/H PAWS.

Massive bleeding

Airway

Respiration

Circulation

Head and Hypothermia

Pain

Antibiotics

Wounds

Splinting

The treatment in MARCH/H PAWS covers the vast majority of care in both the tactical field care and tactical evacuation phases.

Pneumonic devices are helpful for a few reasons. First, it organizes an operator's thinking in terms of the consecutive order with which to perform interventions, as well as confirming the complete delivery of necessary care. Second, it is helpful in kinetic environments to allow the provider to gather his or her thoughts and ensure nothing is missed. Also, in the midst of care, it is easy to go back to the mnemonic and run through it to continue with care if the operator becomes confused as to what to do next or has to care for a more critically injured or wounded patient. Third, using a mnemonic device is a time-proven method to enhance education and training, as well as imprinting the material in the brain. Finally, it is useful in organizing one's ruck and

ensures that immediate lifesaving gear is organized in the two outer pockets — one for **M** and one for **A/R** — as well as putting this gear as needed in pants pockets or on a vest. The inside of the ruck continues to be organized in these categories.

HEMORRHAGE CONTROL PRODUCTS

The first letter, **M**, is approached by first looking for extremity hemorrhage and tourniquet placement and then junctional hemorrhage for the use of combat gauze (CG) or other hemostatic agent, or a junctional compression device. After these two items, there are a variety of items one can use for pressure dressings. These include but are not limited to 4x4 gauze, elastic bandages, cravats and Israeli bandages. Recently, other dressings that are transparent and/or elastic have been introduced to the market. Basic principles for choosing a piece of gear in tactical medicine are as follows:

1. Multiple uses
2. Easy to use
3. Small
4. Lightweight
5. Avoid redundancy with other products

We have found that after a tourniquet, one is limited by space and weight; it makes more sense to use CG and a cravat as your primary tools for dressings or pressure dressings. All of the other items are redundant to these two items and do not have as many individual uses. CG can be used as a dry sterile dressing folded in the form of 4x4 or whatever size is needed for any open wound, as well as for wound packing for bleeding wounds, packing for nonbleeding wounds or cavities, circumferential wrap or dressing, and material between the digits in burn patients (Figure 1). It seems self-evident to use CG for all wounds that are bleeding or oozing and do not require a tourniquet, rather than use a dressing without a hemostatic agent (Table 1).

A cravat can be used to quickly tie around an extremity over CG as pressure dressing (Figure 2). This makes sense



Figure 1 (left) CG folded as a “4x4.” (right) CG is used as circumferential dressing.

TABLE 1

USES OF ITEMS FOR STERILE DRESSINGS, PACKING AND PRESSURE

	Hemostatic Agent	4 x 4 (DSD)	Wound Packing	Circumferential Wrap/Sterile Dressing	Pressure	Large Sterile Dressing
CG	×	×	×	×	×	×
Cravat					×	
Israeli		×		×	×	
ACE				×	×	
Kerlex		×	×	×		×
4 x 4 gauze		×	×			

Notes: DSD = dry sterile dressing.

Cravats can be tied the tightest and do not require pins or tape to secure it and can be used to hang IV/blood bags, secure splints, etc.



Figure 2 Scalable pressure dressing with a cravat over CG.

Figure 3 CG and cravat dressing for large area. (A) CG on scalp. (B) Rear view. (C) Side view.

because the pressure one can generate over a wound with a cravat wrapped twice is greater, if needed, than an elastic wrap of any sort or of a rolled bandage or gauze. It can also be placed more loosely as desired. Finally, it can be secured with a simple double knot, obviating the need for tape or pins (which are much more time consuming and require further dexterity).

Of course, cravats can also be used for their usual role as arm slings, securing a pelvic sling, suspending intravenous (IV) bags, scalp dressings (like a bandana), etc. (Figure 3). They can be used to cover large surface areas quickly to prevent further contamination. To make a large sterile dressing, you can simply place layers of CG under a cravat and use duct tape (or chest seals) to keep it down if on the torso (Figure 4). If you need to make it waterproof, you can use chest seal packaging on top or use part of a survival blanket.

Duct tape complements cravats, and it is the only tape that needs to be carried, unless you wish to carry lighter

tapes for IV lines. However, duct tape can be used to secure any other dressings and to provide pressure with circumferential wrapping (this is partly based on the assumption that everyone carries duct tape). Duct tape is also successfully used for blister prevention and treatment, gear repair and securing things such as taping down a blanket so it does not blow away in the rotor wash, among other routine uses.

Another item to use for dressings is tubular gauze, which is very compact and light. It is used to secure dressings on the extremities. It is particularly well suited for elbows and knees to secure 4x4 or combat gauze compared with any other wrap. It eliminates the need to tape things, can be applied in five seconds and, if one uses cravats or an ACE bandage that is not tight, prevents the dressing from rolling down the extremity with gravity and the tapering of the extremity. For example, in exercises and in the hospital, providers place gauze bandage rolls around an arm or a leg and, despite anchoring it with tape at the edges, it slips down in minutes.

ORAL MEDICATION

Another “lighter, faster, simpler” concept is carrying as many oral medications that can be substituted for parenteral (other than oral) medications if possible. The recommended list includes meloxicam, acetaminophen, moxifloxacin, ondansetron, diphenhydramine and dexamethasone. It is also safer to take “sharps” out of play.

As pointed out in the “Advanced Tactical Paramedic Protocols Handbook” (previously known as the “Training Supplement”), any patient who can swallow² (and does not have a significant abdominal injury) can take their medications via the oral route if immediate IV access is not available. However, this is often a self-fulfilling prophecy, because the patients who need immediate IV drugs are generally not found to be awake, alert and composed enough swallow. Also, it is quicker and easier to tell the patient to take a pill than to get medication out of the secured box; gather the syringe, needles and alcohol pads and perform all these maneuvers, which include fine motor skills; draw the medication; confirm the dilution and correct drug math; inject it; and then dispose of the syringe and sharps. It is even worse in low-light conditions or aboard an aircraft experiencing turbulence.

NUTRITION

Following the concept of the use of oral medications is patient and operator nutrition. The value and science of sports nutrition for athletes, and for all who train (ideally, every operator and military medic or physician reading this article), are well established. The same concepts and principles apply for athletic and operative performance. This is becoming more accepted as operators continue to evolve as



Figure 4 (A) Large surface area dressing with CG, cravat, and duct tape. (B). CG covered by cravat. (C) Final dressing.

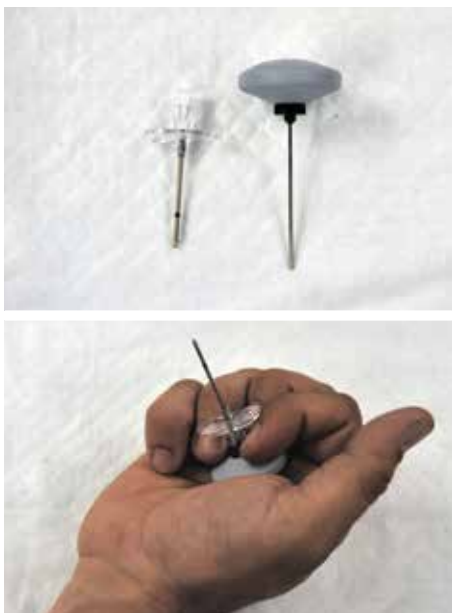


Figure 5 Manual driver for humeral head IO.

tactical athletes and treat themselves as elite athletes (emphasizing rest, recovery, stretching, nutrition, etc.).

When two well-known American mountaineers climbed Nanga Parbat in five days in the Himalayas, they relied on sports gel, cashews and tea brewed on a stove. Sports gels contain 100 calories of easily absorbable carbohydrates, and raw cashews (like protein bars) contain protein and fat. The nuts are better than the bars because the fat is unsaturated. Thus, these two items contain the most important three macronutrients. One should consider adding a multivitamin for extended care settings.

Without getting into nutritional science, which supports this, a sports gel and dense caloric protein bars (greater than 300 calories) are recommended. These are compact and easy to use. For extended operations, you can titrate using one gel every 30 minutes to three hours depending on effort and one-third to one-half of the protein bar every two to four hours. The protein helps modulate the insulin response to the carbohydrates, among other benefits.

The operator can use a sports gel as needed for quick energy if depleted and/or about to make a run for it, climb or carry a patient over uneven terrain, etc. The patient can be given GU Energy Gel (guenergy.com) if he or she is depleted and needs to get to another location for extraction or safety. The combination of GU Energy Gel and protein bars can be used to sustain patients and operators over several days in an extended field care and isolated setting.

One can also use energy gel instead of carrying glucose paste for hypoglycemia or altered mental status of unknown cause by putting small amounts inside the cheek (buccal pouch).

MANUAL INTRAOSSEOUS PLACEMENT

When patients are in shock or need an IV line established and IV access is not attainable, the authors generally rely on humeral head intraosseous (IO) lines placed with a drill in the HH-60. Although most PJs have not begun to carry the drill in the ruck, we have begun to use manual, non-spring-loaded IO devices for humeral head insertion in the field (Figure 5).

The humeral head is preferred for insertion because it is easily accessible from the side of the patient and it is difficult to get above the patient's head in the helo to place a sternal IO. It is relatively easy to quickly place two lines in 30-60 seconds if the lines are prepped (one for TXA and one for blood products and then more blood to follow the TXA). Humeral head IO lines do not impact body armor if it remains nor the ability to perform chest compressions, and tibial sites are generally not available. While it is easier to have a line in the upper body than in the lower body, when possible we still use tibial IO lines on pediatric patients.

PULSE OXIMETRY

Pulse oximeters are great because they allow the operator to multitask on rolling up to the severely injured patient. The operator can place the pulse oximeter and begin other tasks and in 10 to 20 seconds will have two key vital signs. This also helps many other interventional decisions to be made within a very short period of time. This does not obviate calculating the pressure and quality of a pulse. The pulse oximeter can be left on as a monitor by taping it so it does not fall off or get lost. It is so helpful that it should be kept outside the ruck on an

extendable leash, although some operators keep them on their vest for immediate access. A second pulse oximeter can be kept in the ruck with other diagnostic equipment as a backup or for use in a critical care patient with multiple casualties.

If the patient requires ongoing monitoring, the operator can secure it to the patient using the leash or tape it to the patient’s finger.

CADAVER LABS

Cadaver labs offer tremendous value for training. The use of human anatomy complements the skills learned in live tissue training and scenario-based training but does not replace it. Regional domestic SWAT medics from different agencies worked with the authors and have stated that the cadaver lab program was among the best training they had in tactical medical training. In fact, a recent after-action report from a tactical medic credited the skills he practiced in the lab with helping achieve success in a difficult intubation in a cramped apartment in an urban setting for a shooting victim. Table 2 shows the procedures that are taught and practiced.

Besides the advanced airway techniques practiced, confirming successful needle decompression placement is an important task to practice. Although all operators are capable of verbalizing the correct needle placement, approximately one-third are incorrectly placed on the first attempt. The opportunity for a physician or medical director to supervise and confirm proper performance of various techniques in a controlled environment, and then allow

the operator to repeat this procedure with confidence to instill muscle memory, cannot be overemphasized. It is the only way they most likely will perform this correctly in an operational setting.

STRAIGHT NEEDLE SUTURE AND ONE-HAND SURGICAL TIE

The last piece of gear and technique that has value for advanced medical operators is the use of 2-0 nylon or silk on a straight needle and the one-hand surgical tie. If you are supporting combat and do not need a surgical kit for debridement or minor surgical procedures, you carry a single clamp/hemostat with which you can clamp a large vessel, or place a chest tube, and leave the minor surgical kit at home base. Add two or three disposable scalpels to make the kit complete.

A straight needle can be used to suture, oversew bleeders and anchor chest tubes. One can then use the tip of the needle, or a knife, to cut the suture when finished. The details of this simple item and techniques for use will be detailed in a subsequent article.

The one-hand surgical tie can easily be learned on YouTube. Staples also remain a good option for scalp lacerations, but a running suture is a good option to have for scalp and facial hemorrhage as well. Once one becomes adapted to the one-hand surgical tie, it is easier to perform than instrument suturing, especially in low-light conditions, and does not require as much fine motor skills as instrument suturing. Five packages of sutures on a straight needle take up no space and weigh virtually nothing.

SUMMARY

MARCH/H PAWS is a helpful tool in providing care during the TCCC phases of tactical field care and tactical evacuation. Oral medications are delivered faster and safer, and gels and food bars are important additions for operator performance and patient care. The manual IO driver and pulse oximeter are devices to be considered for use in various settings with other indications. Cadaver labs allow expanded procedural practice on human anatomy with direct supervision that can enhance mission completion in a timely manner by gaining proficiency. The use of suture on a straight needle is a tactical improvement over conventional instrument suturing because it is more tactile, obviates the need for a surgical kit, is faster and is more reliable in low-light conditions.

These are some of the concepts and items that allow the paramedic community to carry a little less gear and become more efficient in providing the necessary care for our war

TABLE 2

CADAVER LAB SKILLS

Intubation with and without bougie
Video-assisted intubation
Needle cricothyrotomy
Surgical cricothyrotomy
Needle decompression — both sites
Chest tube insertion and anchoring
Fasciotomy
Amputation
Suturing — instrument tie and one-hand surgical tie

fighters. Many of these are transferable to domestic tactical operations, as well as medical care in remote and austere environments for anything from disaster response, to civil search and rescue, humanitarian operations or even adventure travel. Continued evolution of medicine should lead to reconsiderations of how to provide care in the operational military environment and beyond. ■


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