

Wounds dressing under extra-ambulatory conditions

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Summary:

The hereby work includes general rules of bandaging and subsequently — dressing agents and materials along with detailed illustrated instructions of their use in different situations. Furthermore, the ways of wounds cleaning and infections prevention are taken into account.

Key words: dressing agents and materials, rules of bandaging, codofix dressing, triangular bandage, Hippocrates cap.

Features of dressings.

Dressings are used in order to protect the wound from weather, further damage, contamination and infection. They can also be used to fracture and dislocation immobilization or to cause compression (e.g. to reduce bleeding). The dressing should also absorb secretions from the wound.

Dressing agents and materials.

Dressings and bandages were used in ancient Greece, Egypt and India. In some cultures, the ability of bandaging became the art (ancient Egypt).

The need for fixing dressings on wounds in such a way that movement is not hampered and is comfortable, and on the other hand does not fall and moved, has led to the development of suitable techniques for bandaging. A variety of dressings was created, designed for all types of wounds. Currently, there are modern

self-adhesive dressings that do not require an additional mounting, providing with optimal conditions for wound healing.

Nevertheless, I believe that in an emergency in a street, each person can be compelled to assist wounded, without any dressings. Several problems arise here:

- How to clean a wound?
- How to protect yourself against possible infection?
- What needs to be applied directly to the wound?
- What is needed to attach the dressing?
- What immobilizes a broken or dislocated leg?
How can a broken leg be immobilized?

What is needed to clean a wound? How to clean a wound?

It is a professional action to clean and even disinfect the wound.

For cleaning the following may be used: sterile distilled water, saline (0.9% NaCl), and for the lighter flesh wounds: 0.3% of hydrogen peroxide or modern aseptic, e.g. Octenisept that does not smart like aseptic of older generation and is universally applicable, both for the decontamination of the skin and wounds as well as mucous membranes.

In the case of dressing in the street, such measures are rather inaccessible and wound cleaning is not always necessary. If the wound is deep or wide and covered with mud, earth, etc., any of the cleaning agents are not used. Flesh wounds, a simple, no jagged edges, do not require special treatment because blood flow flushes out the minor impurities and microbes.

Flesh, heavily polluted wound should be washed before the application of the dressing. This can be done using either pure tap water or mineral water provided that the previously nobody drank directly from the bottle (salivary microflora multiply very rapidly in water). The wound should be washed with a stream of fluid – without high pressure. Furthermore, the wound must not be touched with bare hands, for two reasons:

- 1) the wound can be additionally damaged or the bacteria of the skin of hands can be entered into the wound, or
- 2) by touching the wound, blood or secretions of a patient – we can potentially become infected with HIV, hepatitis, syphilis and others.

How to protect oneself from possible infection?

In order to protect oneself from infection while helping the victim, protect your hands with rubber, latex or foil gloves, foil bags, or foil for example from bags, making sure that the used materials were clean (not previously used). Added to the above, protect your mucous membranes (eyes, mouth), do not touch mouth, eyes and nose with the used glove, if possible, use protective glasses or goggles.

Do not use sweetened beverages, milk, water from a pond or puddle, alcohol, gasoline, etc. for wounds

cleaning, the fluids can be a breeding ground for bacteria, infect the wound or damage tissue.

Furthermore, for larger wounds do not use such dyes as gentian, methylene blue, etc, because they prevent the doctors from proper assessment of the wound and application of the proper surgery.

What needs to be applied directly on the wound?

Always cover the wound with a sterile dressing; the more serious the wound, the more important it is. Furthermore, more serious burns are always dressed with sterile agents, even when the bubbles have not burst yet.

A sterile dressing is sterile gauze or sterile gauze swabs in a double pack (two layers of packaging) (Figure 1). They are always the equipment of the first aid kit in a car, and the first aid package of the city guard.



Figure 1: The content of the first aid kit is enriched with codofix dressing size 6 and 2.

Above, from left to right there are: elastic bandage, knitted bandage, thin elastic bandage by Hartmann company, at the bottom there are: triangular bandage, latex gloves, sterile gauze compress (sterile gauze).

Sometimes in the first aid kit the following can be found: a package of sterile, thin strips of plasters to combine the cutting edges – (tips). They are used after bleeding has been controlled in order to combine edges to each other. They can be used instead of stitches with reference to minor wounds provided that they are properly installed.

If you provide support outside the built-up, secluded areas, you are forced to choose the less invasive way while dressing wounds – the

cleanest materials that are available are supposed to be used, even if they are not sterile, and the wound requires immediate dress.

Do not put cotton, lignin, tissues, and others that can be left in the wound fibers and particles of the material directly on the wound. Do not put talc, flour, etc. on the wound. Do not put grease the wraps of kefir, buttermilk, etc. on the wounds after burn.

How to attach the dressing? What is needed to attach the dressing?

If the wound is serious, the emergency is needed to be called (999, 112). The dressing does not have to be then applied precisely, sometimes the necessary thing is either just holding the dressing with a hand protected by a glove or foil until the ambulance arrives, or tying a triangular bandage, a handkerchief, a scarf, etc. The outer dressing (bandage) may not be sterile. However, it is better to bandage minor wounds in the proper way, so that the dressing does not slid, twist, press, and stop movements. Therefore, it is worth to be able to perform proper bandaging. Depending on the type of used bandages (woven, knitted or elastic) (Figure 2) the rules for their use, and general principles of bandaging at all need to be obeyed.

a) Woven bandages



Figure 2: Sterile dressing materials (swabs and gauze) in the double-layer packaging, codofix dressing and different types of bands below: elastic with clip, thin elastic bandage of Hartmann company and simple knitted bandage.

The dressing with a woven (gas) bandage is the most difficult to perform, due to the fact that thread are shredding and entangling making unwinding the bandage difficult. The bandage

is not elastic and adhere to the body difficulty, therefore it must be applied with great precision. It must be attached neither too loosely, because it will not meet its function, nor too tight, as this makes blood circulation in the body difficult. When dressing is finished, either fix the bandage end with the adhesive part, or cut the end along (you will need to scissors or a sharp blade, because it is difficult to tear) and tie around the dressed limb. Woven bandages are used less and less, and now almost unavailable for purchase.

b) Knitted bandages

Knitted bandaged are easier in dressing performance, because the edges do not shred, it is easy to tear the excess bandage, and tear the bandage along. It is placed on the bandaged part of the body better than the woven bands, but similarly to the woven bandage it is not elastic and it is not allowed to dress it too tight. When dressing is finished, rip off the bandage excess (straight), tear the end down, combine the ends in a form of a single kink, and combine around the dressed limb.

c) Elastic bandage

Even an unskilled person is able to make the dressing with the elastic bandage, which is thicker than the others, thin rubber is woven into the fabric, the edges do not shred, clasp for attaching the end of the bandage is attached to the set for each bandage. The bandage should be put loosely, not pulling hard, due to the fact that woven rubber exert pressure and maintain the dress precisely on the wound. The bandage excess needs to be cut, because it is difficult to tear it. The clasp is placed in a way that shall not interfere with the movement, limb resting or during sleep. Each bandage, in particular elastic one, should be put sparingly, because too thick dressing causes overheating, sweating, burning or rash of wound and inflammation of the dressed part of the body.

d) Codofix dressing

Elastic mesh sleeves — the so called codofix dressing is used nowadays more and more often instead of elastic bandages (Figure 2, 3). Only hold the dressing and stretch codofix with sufficient length and width on the wound. The action is performed by 2 people the most convenient — one

person holds a dressing, the other one applies codofix stretched on his/her hands. It is convenient to use a special applicator, on which codofix dressing was previously stretched. Proper adjustment of the size of the sleeve to the volume of the dressed part of the body is of crucial importance. (Picture 3 and 4).

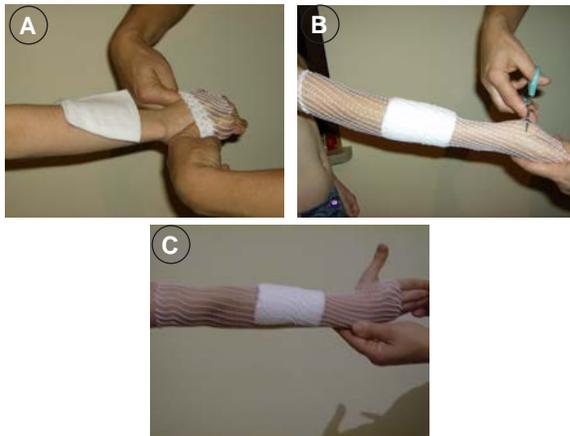


Figure 3: Forearm dressing in a child with codofix no. 2



Figure 4: Head dressing with codofix no. 6.

e) Triangular bandages

The bandage is a triangular piece of either a cloth or a nonwoven, which can be wrapped on any injured part of the body. However, it is used as a sling or to fix immobilization splints the most



Figure 5: Upper limb immobilization with triangular bandage.

often, and sometimes to compress bleeding dressings.

How to immobilize splayed, broken or injured limb? What is needed to immobilize splayed, broken or injured limb?

Both broken and splayed limbs always need to be immobilized, added to this some of the injuries require immobilization, especially when a foreign body is in it, or injury is severe. In a street we do not always manage to find the right splint or materials to immobilize various parts of the body. In such cases, just fix the injured limb to the body of the victim.

The general principle is to immobilize the next two joints at both ends of the broken bone with the fracture site.

The injured cervical spine can be dressed with a special car pillows of crescent-shaped, or support on both sides the head of a person lying (shopping bags, briefcase, beverage cartons, etc.) instead of a special collar. However, professional performance is required to put boards under the spine and head bandage.

The action performed improperly may cause damage to the spinal cord, and as a result total disability.

With reference to the shoulder injury, there are the following possibilities: combine the arm to the chest, and combine the forearm bent at right angle to the sling with a scarf, handkerchief, or place hand between the buttons of the buttoned shirt or jacket. The upper limb can be withered, sensory disturbances may occur with such injuries, for these reasons make sure that the sling does not cut into the forearm — and therefore it cannot be made of a thin ribbon, string or shoelaces. The forearm can be also placed on a folded newspaper, then the string will not cut into the body. Moreover, the string can also constrict the neck, for this reason it should be tied to a shirt or jacket collar or attachment must be wide (Figure 6).



Figure 6: Several-folded newspaper can be a base for a broken arm, which can be hung horizontally with laces, tie, or key leash, or other currently available items.

Similar activity is performed with reference to arm injury, fix the arm to the chest with a stiffening item (rolled up newspaper, umbrella, etc.), but the whole forearm should be hung on a broad level (a triangular bandage or rolled newspaper, corrugated cardboard box etc.).

The following need to be performed with reference to the forearm injuries: hang the forearm with a stiffening item as above, which should also support the whole hand, including fingers.

The easiest way to immobilize the injured forearm is: unbutton the shirt from the bottom up to the elbow, wrap skirt on the forearm and button the last above button hole so that the forearm and hand lied horizontally (Figure 7).

With reference to injuries of hands and fingers, arrange stiffening items on the inside of the hand

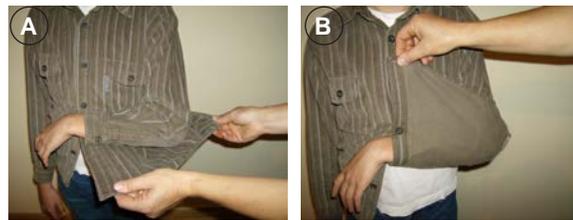


Figure 7: A makeshift sling can be made from a wrapped half shirt. If there is a need to immobilize the forearm with the hand, the newspaper may be first placed under the hand, like on Figure 6.



Figure 8: Immobilization of the hand on a grill aluminum tray lined with handkerchief with triangular bandages.

from the elbow or mid-forearm so that they extend beyond the fingers. The hand should not hang. The entire forearm should be suspended horizontally.

The patient with the injured lower limb should lie comfortable. If possible, the immobilized leg should be lightly up and supported — on the folded jacket, briefcase, purse, etc. (Figure 10).

Do not touch the limb with open fracture and dislocation; immobilize the limb in such position what was found, support and stabilize it using a variety of on-site items or place the other, healthy limb in the same way next to the injured limb, and both broken legs are fastened to each other by a bandage, handkerchiefs, belts, scarves, etc. in some places. Moreover, use the rule for fracture immobilization with adjacent joints.



Figure 9: Immobilization of the hand on a grill aluminum tray lined with handkerchief with triangular bandages.

Use splint to immobilize injured hip (board, ski, limb, etc.) from the armpit at the top to the calf or ankle fracture below, attaching it in many places to the chest, hips, thighs and calves.



Figure 10: Immobilization and support of the limb with injured thigh and knee using a stick of brush, limbs, handkerchiefs and triangular bandages.

Immobilization should extend from the waist to heel with injuries of the thigh or knee (Figure 10)

Immobilization should range from mid-thigh to the heel with injuries of the lower leg (calf); however, the splint should extend beyond the heel.

General rule for bandaging:

1. Adjust the width and the type of bandage to the bandaged part of the body. For the dressing of the finger, use a finger narrowest bandage width of 5 cm, for the dressing of thighs and hips — bandage of 10–5 cm and the widest for dressing of chest and abdomen. Move the collected material (sterile gauze, bandages and clips) to the victim as close as possible.

2. Keep the rolled-up bandage in your right hand (for right-handers) and the end of the bandage in the left hand. The rolled part should be facing up. Always put a bandage on the wound from the

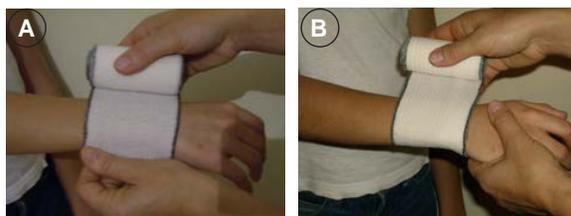


Figure 11: The bandage is held in the dominant hand, the rolled part if facing up, put a small part of the unrolled bandage from top to top on the dressed part of the body. The dressing begins with a circular wrap that fix the beginning of the bandage before the actual start of dressing.

top, so that the bandage can be placed around the dressed part of the body without bandage unwrapping. This way greatly reduces the possibility of dropping the bandage (Figure 11).

3. The bandage is unrolled gradually during the bandaging — it is easier to control the right positioning of the bandage and its stretch.

4. The injured should sit or lie down comfortably — depending on the condition and the bandaged part of the body. The person performing the dressing should not only turn to the wound, but also be able to see the face of the injured or at least maintain voice contact with the injured. We need to know if the injured condition is getting worse or not, or if he/she does not lose consciousness.

5. The dressed parts of the body should be supported, which ensures comfort for both the injured and a person dressing the wound.

6. Do not allow to contact between the two surfaces of the skin under the dressing. Separate them with gauze or other absorbent material.

7. Each dressing accumulates heat produced by the body and prevents from evaporation of perspiration, which can lead to rash and even create the conditions for bacterial growth. Put bandage rather sparingly, only the amount of bandage to cover the wound dressing.

8. Begin the bandage process with round wrap (bandage is wrapped 2–3 times around the wound so that the layers overlap each other). The bandage must be put so loosely as not to interrupt blood flow and tight enough so as not to twist during bandaging.

9. The layers of bandage should cover at least half of the previous to $\frac{2}{3}$ of its with so that the dressing can thoroughly cover the entire bandaged surface (Figure 12).



Figure 12: The method of applying another layer of bandage.

When the bandage application is finished, fix the end of the bandage (with fastener, plaster, or tying the cut end) in a visible place, not disturbing the injured. Fasteners should never be hidden between layers of bandage, because the X-ray image may mislead the physician (foreign body in the wound?).

Bandaging technique.

1. The types of wraps

One-axis wrap — are used to dress the straight sections of the body such as the forearm, arm, lower leg and thigh.



Figure 13: Round wrap starting the dressing.

- a) Circular wrap – is used to secure the ends of the bandage at the beginning and end of the dressing. (Figure 13)
- b) Snake wrap — the only one which does not comply with all the rules of bandaging; it



Figure 14: Snake wrap holding a sterile dressing.

is used only to hold fast the dressing layer before applying bandages or immobilizing splint fixing. Subsequent layers do not overlap and leave open spaces between them. (Figure 14)



Figure 15: Screw wrap on the forearm.

- c) Screw wrap — applied spiral, covering $\frac{1}{2}$ to $\frac{2}{3}$ of the previous layer, in places where the

body is deprived of a significant swelling and does not expand too much. (Figure 15)

- d) Folded wrap — used to cover expanding places such as muscular calf. This type of wraps provides with good dressing adhesion on anatomical swells (Figure 16). Perform the even number of wraps to finish the dressing with circular wrap with properly held bandage, because the bandage turns to the other side at each wrap.

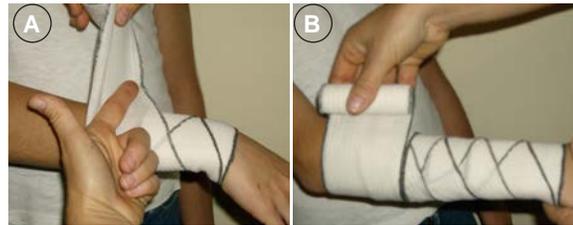


Figure 16: The method of application of folded wraps.

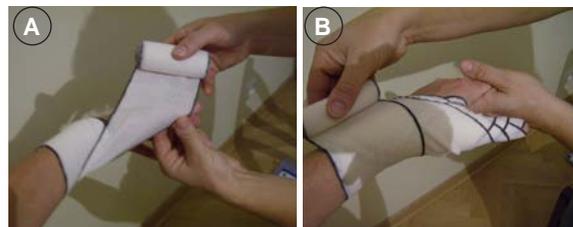


Figure 17: Herringbone, bottom-up dressing of a thumb.

— Herringbone, bottom-up and top-down dressing — are used to dress the same joints or body parts that lie below the joints. They rely on imposing eight-shaped wraps, alternately arranged above and below the joint. The wraps can run in a “herringbone” from top to bottom (top-down) or bottom to top (bottom-up) (Figure 17).

— Tortoise convergent and divergent dressings — used to dress such parts as the elbow, knee and heel. Convergent dressing starts above or below the joint, divergent dressing starts from the middle and is alternately, gradually placed above and below the joint (Figure 18).



Figure 18: Turtle divergent dressing of the knee.

Two-axial wraps — used to dress the moving parts such as knees, elbows, hands, fingers, shoulders and other joints.

Triaxial and multiaxial wraps – are used to dress the chest, sometimes the head, for example: Dessault dressing, breast dressing, helmet and more. They are often very complex, placed when the usual bandaging is ineffective, and it is hard to keep the dressing in place.

Bandaging education step by step

Forearm dressing

The injured sits comfortably. Prepare dressing materials, support his/her hand on a splint, a table, or sit in front of the injured, and support his/her hand on your knee. If necessary, wash the wound, then dress a sterile dressing directly on the wound. Select bandage of a width of approximately 8 cm. Fasten the bandage with circular wrap on the wrist (2–3 times) (Figure 13). Continue the dressing with screw or folded wrap, fix with circular wrap. In addition, hang the dressed limb in a sling.

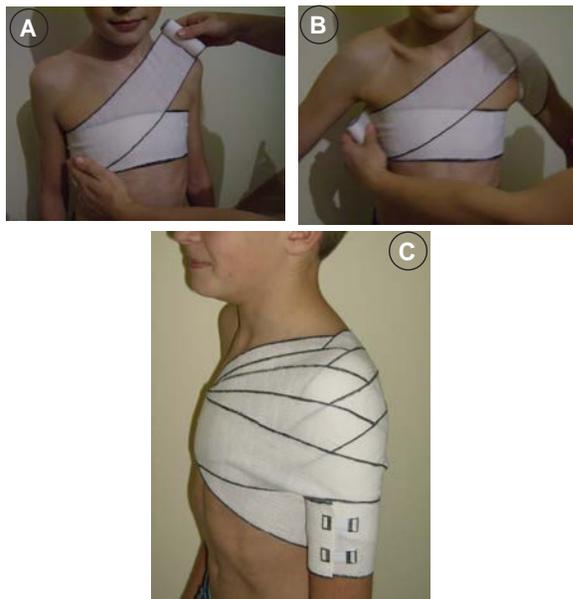


Figure 19: Two-axial, herringbone top-down dressing of an arm.

Dress straight parts of the limbs in a similar way: lower leg, arm, thigh, from the distal side (ankle, elbow, knee) (Figure 15, 16).

Herringbone, bottom-up dressing of a thumb

The injured sits, his/her forearm is supported. Prepare a sterile dressing and a narrow bandage

(about 5 cm wide). Cover the wound with a sterile dressing. Start bandaging with circular wrap on his/her wrist, and then carry out the bandage diagonally through the thumb wrapping its bulb in such a way that a piece of nail is visible. Wrap another bandage loops in an eight-shape around the thumb and wrist in such a way that wraps on the thumb are arranged closer and closer to his roots, and on the wrist are overlapped on each other. Finish with circular wraps on the wrist. The end of the bandage is fastened to the outside of the wrist, or in the line of the thumb. (Figure 17a and b)

Dress the whole hand and foot in a similar way, remembering about the separation of the skin between the toes (even healthy) with gauze or other absorbent material to prevent from rash.

The other part of the body is the arm, hip, buttock, which can also be covered with a herringbone top-down dressing, imposing further wraps between the circumference of the chest and arm, around the waist and thighs, crossing the bandage on hip, or buttock (Figure 19 a, b, c).

Head dressing

The injured should sit. If he/she is fully conscious, and while bandaging his/her face behavior, color, manner of speaking need to be observed. If his/her face is not visible, the conversation needs to be carried out with him/her; ask questions to find out if he/she does not lose consciousness.

Both the unconscious or impaired consciousness persons and conscious people, but with severe injuries or bleeding need to be lied comfortably, and the other person is necessary to support the head while bandaging.

a) Hippocrates cap (Figure 20)

It is a bandage covering the whole head, performed simultaneously with two bandages. If the injured lies, the help the other person, who supports head, is needed.

Start with circular wrap with one bandage just above the eyebrows and on the back, low on the nape of the neck, then the other bandage is applied above the forehead, and apply the first bandage. The below layer of the bandage is placed on skull up to the neck. At this point, hold it with the circular wrap of the fist

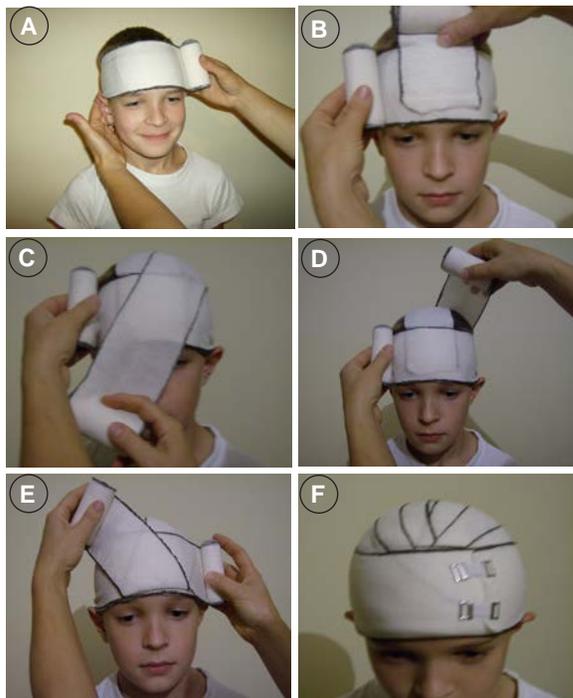


Figure 20: Further steps of applying Hippocrates cap

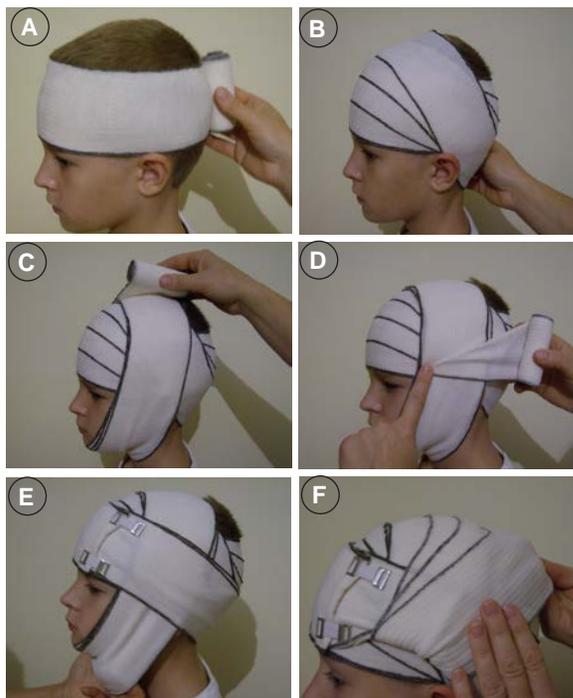


Figure 21: Further steps of applying the helmet.

bandage. From this point, the second bandage is drawn from the occiput to the forehead and back, once to the right and once to the left side of the head and below, half-covering the previous wraps. Every time, before the second bandage comes back, it is bandaged with the first one on the forehead and the neck. After covering the

skull, perform circular wraps holding the dressing in place of the first bandage application. The end of the bandage should be fixed at the front, near the forehead. (Figure 20).

b) **Helmet**

The head dressing performed at the same time with only one bandage, mainly two bandages are used to the whole dressing.

Start with a circular wrap around the head (front just above the eyebrows, the back of the occiput). Further wraps are applied at the front and above the forehead, and at the back they are applied deeper and deeper into the back of the head, crossing just above the ears. When other wraps cover the entire back of the head, apply the bandage over the skull and down under the chin (3 – 4 wraps, but cannot be too tight). Wraps must be fixed with circular wraps as in the Hippocratic cap, just above the eyebrows and just above the neck. To finish the dressing and cover the last part of the skull, take off wraps from the beard and, turn it to the other side, and apply over the skull, extending each layer so as to cover the last part of the skull. (Figure 21.)

Dessault dressing

It is a complex, three-axis, bandage immobilizing shoulder, arm and forearm.

Due to the fact that the entire upper limb is attached to the chest, it is necessary to separate the layers of the skin, which will be combined to each other and sweating excessively, e.g. the armpit, therefore the separating layer should be made of hygroscopic material. The whole arm laid along the chest, and the forearm is laid across. The victim holds an injured hand by the wrist in the described arrangement. Bandage the whole arm to his/her chest, starting just below the shoulder to elbow. In the next stage, apply the bandage under the armpit, place it over the arm, then under the elbow, and from the elbow back under his/her armpit. The bandage is now under the armpit, but in the opposite direction than previously. Perform the same action, but on the opposite side of the chest, applying the bandage through: armpit, arm, and elbow. When returning the bandage under the arm in front of the chest, another layers are arranged deeper under the forearm, to the wrist. The last step is supporting his/her hand in a sling

or triangular bandage, or on a broad bandage (Figure 22)

Dressings with triangular bandages

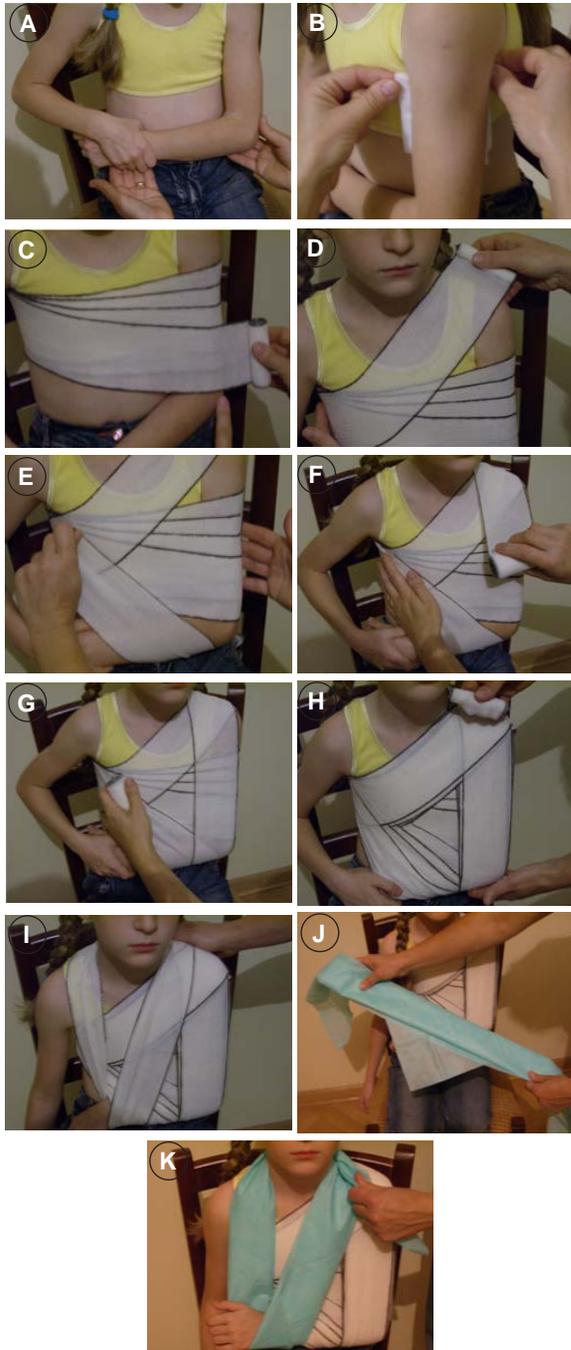


Figure 22: Further steps of triaxial Dessault dressing application

If we have a car first aid kit, triangular bandages can be used for quick dressing. Almost every part of the body can be bandaged with it.

a) head dressing

Apply the bandage with the long edge on the occiput in a way that the triangular end reached to the mouth or chin. If it is too long, wrap the cuff on the occiput, and cross the ends over the forehead, wrap the triangular edge up exposing the face, roll up the crossed ends, tie them in the front or the back, depending on the length of the ends of the bandage (Figure 23).



Figure 23: Head dressing with triangular bandage

b) foot dressing

Place the bandage under the foot, the corner at the fingers. Put insulating layer under the foot (in addition to established proper dressing), so that the injured can support the foot on it. The layer can be made of a folded cloth, paper, protecting it from the bottom with a piece of foil or impermeable material. Place the foot on this layer, the corner is wrapped on the top of the foot. Put the edges of the folded part on both sides on the top of the foot two times, so that the material can be well-adhered to the fingers and sides of the foot. Bend up a wide strip of material behind the heel, it is possible to do cuff with the excess of fabric, crucify the ends of the bandage at the front and wrap around the ankle. Tie the ends. (Figure 24).



Figure 24: Figure 24. Dressing feet of triangular bandage as a solely dressing or as a protection for bandage dressing from getting dirty or wet.

Acknowledgements:

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