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SURGICAL DRESSING

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This invention relates to surgical appliances and more particularly to surgical bandage or dressing that may be used for the treatment of fractures, deformations, enlargements or dislocations of bones or joints of an animal or human being. In its more specific aspect the invention is directed to a novel type of dressing or bandage adapted to be employed in the formation of a dressing or cast around some part of a body.

Heretofore it has been common to employ a plaster of Paris dressing or cast around the fractured portions of a body in an effort to prevent displacement of the fractured portions. This cast is produced by first providing a thin layer of ordinary bandage such as muslin or the like with a layer of plaster of Paris. Then the patient is put under an anesthetic and the fragments are reduced under the fluoroscope. After this, the bandages are saturated with water and then applied to the injured part by winding the same thereabout. A dressing or cast of plaster of Paris sets in about thirty minutes and hardens in about twenty-four hours.

Experience has shown that plaster of Paris dressing or casts have not been satisfactory in a number of instances, and have the following disadvantages:

When plaster of Paris casts are employed the fragments must be reduced before the application of the plaster of Paris bandage and there is a high probability of disturbing the reduced fragments while applying the cast.

The dressing is generally thick and heavy.

There is only a limited possibility of seeing anything definite about the position of the fragments protected by a plaster of Paris dressing when subjecting the same to a fluoroscopic examination; and in some cases when subjected to a radiographic examination definite information as to the position of the fragments is not obtainable and it is entirely impossible to see callous formation in the early stages.

In case of fractures of the greater trochanter, of upper femur and of the pelvis, it is practically impossible to get satisfactory radiographs taken through a heavy cast.

When an open wound is beneath the cast it is a difficult and tedious undertaking to cut out a window in said cast so that the wound may be treated.

The removal of a heavy cast requires about an hour of hard and tedious manual labor.

It is with a view towards obviating or reducing these disadvantages that my invention has been made. Briefly my invention consists in the provision of a bandage or dressing for providing a novel dressing or cast which may be relatively thin, relatively light, has a high X-ray translucency factor, and, in addition, with my novel cast, fragment reduction may be accomplished after the cast has been applied, but before it has completely hardened. It consists of a fabric impregnated with a filler and a binder which also acts as a stiffener. An adhesive may be incorporated therewith, which adhesive also serves as a binder. A relatively slow drier may be incorporated therewith so as to promote a more uniform drying throughout the thickness of the cast and a fireproofer may be also incorporated therewith. This composition is carried by a fabricated material such as cheese-cloth, muslin, netting or the like.

An object of my invention is to provide a dressing or cast for fractures or the like which dressing has a relatively high translucency factor to X-rays.

Another object of my invention is to provide a dressing which is relatively light in weight.

Another object of my invention is to provide a cast or dressing which will be sufficiently flexible so that fragment reduction may be accomplished when the dressing or cast is initially applied and will so harden thereafter as to prevent deleterious movement of the fragments.

Another object of my invention is to provide a dressing or cast in which a window may be readily made and which may be removed with a reasonable amount of effort.

Another object of my invention is to provide a dressing which when wrapped will provide a dressing or cast which will have a high translucency factor to X-rays.

Another object of my invention is to provide a dressing which when wrapped will provide a dressing or cast which will be sufficiently flexible when initially applied so that fracture reduction may be accomplished at that time, but which dressing will become sufficiently hardened to prevent fracture displacement.

These and other objects of my invention will be readily appreciated from the following description.

According to my invention I have provided a surgical dressing which includes the combination of a base and a composition which has a relatively high translucency factor to X-rays. The base may comprise a felted, reticular or other like fabric such as gauze or the like, and it may be composed of cotton, linen, or other like material which may be readily wrapped or wound.

The composition is preferably of a plastic nature so that it, together with the base, may be capable of being formed or molded around those parts of the body to be protected upon application of the same. The composition should be plastic upon initial application of the dressing and for a limited time thereafter so that the same may be applied to a fracture and is thereafter flexible enough so that reduction thereof may be accomplished with the dressing thereon, but will set and harden within a reasonable period of time

after reduction so that it will protect the fracture from displacement of the parts.

A composition that I have found suitable for this purpose is one which includes a filler, which may be composed of wood, an artificial resin such as Bakelite, aluminum or other substance which is to serve as the body of the dressing when it has been applied and set. The filler should have the characteristic of a high translucency or transparency factor to X-rays. By a high translucency or transparency factor to X-rays, I mean that its capacity to X-rays is low or that a unit thickness of the same will absorb a materially less percentage of X-rays than will a unit thickness of other material, such as plaster of Paris, heretofore employed as the basic composition carried by a surgical dressing. I prefer that the filler be highly comminuted and of a fine flour like consistency. One of the specific fillers that I have found particularly amenable for my purposes is pine, although oak has been used with success, as have been asbestos, Bakelite and aluminum.

In the dressing when set or hardened there is a binder which locks the fine particles of filler to each other. The binder may be of any suitable composition which has a high translucency factor to X-rays, which is rigid in short lengths, which is soluble in a volatile solvent and which is relatively light in weight. For this purpose I employ a cellulosic compound such as Celluloid which is readily soluble in acetone.

Also in the dressing is a suitable adhesive which serves as a cohesion means between the separate layers of the dressing when initially applied. It also enhances the characteristics of the dressing or casting during and after setting and hardening when the same is completely applied. For this purpose I employ an ester gum such as gum acacia or the like which is soluble in a highly volatile solvent such as carbon tetrachloride. This solvent has the further advantage of being non-inflammable and like acetone will not dissolve the filler to a substantial extent.

In order that a more uniform drying or evaporation of the carbon tetrachloride and acetone solvents may be obtained throughout the thickness of the applied dressing I employ a vegetable oil, such as castor oil. The castor oil may also be dissolved in a highly volatile solvent, such as absolute ethyl alcohol, and it promotes uniform drying throughout the thickness of the dressing when it is applied.

If desired a small amount of calcium chloride may be provided to fireproof the composition and especially the cellulosic binder.

An example of said composition which I have found amenable to my purposes as heretofore briefly stated may comprise the following substances, with the parts being by weight:

	Specific	Range
	Parts	*Parts*
Pine wood flour	20	18–22
Celluloid	16	13–18
Gum acacia	10	4–10
Castor oil	4	2–5
$CaCl_2$	1	0.5–2
Acetone	48	20–50
CCl_4	20	18–31
Absolute C_2H_5OH	12	4–17

One method that I have employed to prepare my novel surgical dressing is as follows: First, I prepare my filler flour and if wood is used, I subject the same to an extended heat treatment in order to drive off any of those constituents that are volatilized or otherwise removed by heat. A more cellular structure is thus prepared. This heat treatment is optional. Thereafter in a container I add the wood flour, Celluloid, gum acacia, castor oil, and calcium chloride in the amounts hereinbefore indicated. These substances may be intimately mixed with each other and I prefer to employ relatively small particles of the solid constituents. In another container I place the heretofore set forth amounts of acetone, carbon tetrachloride and absolute ethyl alcohol. These liquids are stirred and then poured into the first mentioned container which is now covered to render the same substantially hermetically sealed. The entire mix may be stirred or agitated while the container is so sealed. After the solutes of Celluloid, gum acacia and castor oil have been substantially completely dissolved, with the wood flour being substantially uniformly distributed throughout this solution, the composition is ready to be placed on the base or carrier.

This composition may be forced through a pair of parallel closely spaced fan shaped nozzles. Each nozzle has an orifice of a length equal to or slightly less than the width of the fabric or base and of a thickness which is relatively narrow and about one millimeter. Passing between the orifices of said nozzles and parallel thereto is the base or fabric, with the speed of the fabric and the speed of the composition extrusion being synchronized so that a layer of said composition about 1 millimeter thick is applied to each side of the fabric. Close to said nozzles are a pair of set press rolls which press said plastic composition into said fabric, with the finished combination being about 2 millimeters thick. Immediately thereafter the dressing is packed in containers which are quickly hermetically sealed.

The dressing is now ready for use and may be applied by winding the same around the fracture. After the proper number of layers are wound thereabout, the fractured member is fluoroscoped and is reduced while under the influence of the fluoroscope. The volatile constituents of alcohol, carbon tetrachloride and acetone have evaporated in parts from the applied dressing during this operation. However, the dressing does not set until after about 30 minutes and will harden in about six hours. If for any purpose it is desired to hasten the hardening process this can be done by placing the dressed member under a lamp or other type of baking apparatus.

The hardened dressing now consists essentially of the fabric, Celluloid, gum acacia, castor oil and calcium chloride because substantially all of the solvents have evaporated therefrom and now there is a substantially uniform light weight X-ray transparent cast or dressing protecting the reduced fracture.

In the event it is desired to provide a window in the cast or dressing, as sometimes happens when a wound is covered thereby, a solution of absolute ethyl alcohol, acetone and carbon tetrachloride applied to the selected area will so soften the casting thereat so that this may be readily accomplished. Another advantageous characteristic of my improved and novel dressing is that by proper application of this solution the cast may be quickly and easily removed at the appointed time.

Although I have described my invention with particularity, it is to be limited only by the prior art.

What is claimed:

1. A relatively high X-ray transparent surgi-

cal dressing comprising the combination of a fabric and a plastic composition, said composition including a filler, said filler having the major part thereof composed of a material having a high transparency factor to X-rays, a binder for said filler, a solvent for said binder, said filler being substantially insolvent in said solvent, an adhesive for cohesion when two layers of said dressing are contiguous, and means comprising a vegetable oil for promoting uniform drying throughout the thickness of said dressing when it is applied.

2. A relatively high X-ray transparent surgical dressing comprising the combination of a fabric and a plastic composition, said plastic composition comprising a filler having a high transparency factor to X-rays, a solution whose solute contains a binder for said filler, an adhesive for cohesion when two layers of said dressing are contiguous and means comprising a vegetable oil for promoting uniform drying throughout the thickness of said dressing when applied, the solvent of said solution being volatile, said filler being substantially insolvent in said solvent.

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