6. MEDICAL DRESSING MATERIAL AND SURGICAL MATERIAL

Medical dressing materials are supplies like cotton, gauze, tampons, bandages, petroleum jelly gauze, gas gauze with medication, first aid bandage, gypsum bandage and plasters bandages and they are used to close injured or traumatized or operated areas of the body, to keep the medication on these areas, to protect the wound from external influences such as dust, microorganisms or friction and to absorb drainage with body fluids. These materials are made of cotton, synthetic fibers, wool and various polymers and mixtures thereof. Cotton, tampons and gauze are generally used because of their absorbent properties and are sterile when necessary. Bandages are materials that are used as providing a safe protection by placing the inner bandage on the injured surface, protecting the wound and absorbing the wound current or by tightly detecting the wounded or traumatized area as an outer bandage. Despite the fact that the inner bandages are sterile, the external bandages do not have to be sterile. The patches are divided into two groups: simple adhesive patches used for attaching dressing material to skin and outer organs, and medicated patches containing active ingredient for preserving, supporting and treating.

Surgical material is the material and supplies that help to stitch, connect, assemble, or support cut, torn, broken, and damaged parts of the body. They are generally defined as surgical threads, as well as expressions such as catgut, suture and ligature. They are grouped into two main groups; those absorptive in the organism are obtained from the collagenous tissues of mammals, muscle tendons or absorbable synthetic polymers. Those who are not absorbed in organism are divided into four groups: those of animal origin such as silk, those made of synthetic materials such as polyamide, vegetal origin such as linen, and metallic wires made of steel, silver, bronze. The surgical threads may be in the form of a single thread or may be in the form of a twisted or knitted yarn bundle. Depending on the intended use and purpose, non-absorbable surgical threads are sterile or non-sterile, and absorbers should be sterile. Absorbed surgical threads are divided into three groups as catguts with normal, moderate and slow absorptions according to their body absorption rates.

6.1. Absorbent cotton (TS 4786)

Absorbent cotton is freed from the oil and waxes found on the seeds of the Gossypium variety (Malvacea). Absorbent cotton should be made of 100% cotton fibers.

6.1.1. Physical Controls

1. Fiber length

The absorbent cotton should have at least 70% by weight of fibers 10 mm and longer and at most 10% by weight of fibers shorter than 6 mm den.

2. Optical whiteners

The 5 mm thick bats from packages are examined for fluorescence in the filtered ultraviolet (UV) light with a wavelength of 366±5 nm. The test sample should show no fluorescence except for a random point.

6.1.2. Chemical Controls

10 g of untouched absorbent cotton is add in a erlenmeyer. Add 100 ml of purified water on it and let stand for two hours. After 2 hours, this liquid is transferred to obtain extraction solution.

1. Surfactant

This solution is taken up in a 10 ml test tube. Shake vigorously 30 times in 30 seconds. Wait for 1 minute. Shake again in the same way. After 10 minutes from the end of the shake, no more than 2 mm of permanent foam should be visible on the solution and on the sides of the tube.

2. Acidity and Alkalinity

Put 25 ml of solution in two separate test tubes from the extraction solution. Three drops of phenolphthalein solution are added to the tube, and one drop of methyl orange solution is added to the other. The tubes are thoroughly shaken. Pink color against phenolphthalein, onion skin color against methyl oranja should not occur.

3. Searching for Chloride, Sulfate and Calcium Ions

Two of the three separate clean and dry test tubes are placed in 10 ml of extraction solution and 5 ml in the third. These tubes are then added with 0.5 ml of silver nitrate, a few drops of barium chloride, and a few drops of ammonium oxalate, respectively. After a few minutes no turbidity should occur. No cloudiness should occur immediately when ammonium oxalate and barium chloride solution are added, and no turbidity should be observed when silver nitrate solution is added.

4. Assay for water-soluble substance

5 g of cotton is boiled in 500 ml of purified water with occasional stirring for 30 minutes. Evaporating water is added. It is transferred by a funnel to a beaker which is weighted. Carefully squeeze and remove the remaining cotton swab with glass rod. The whole solution is filtered hot. Evaporate 400 ml of the filtrate. The residue is dried at 100-105 ° C and weigh accurately. The amount of water-soluble substance should not exceed 0.5%.

The amount of water-soluble substance (%): a-b / p

a: The mass of the beaker being dried (g)

b: Beaker’s tare, (g)

p: Cotton mass used in the experiment

5. Specification of lacquer materials (TS 4786)

6. Ash Content (TS 4786)

7. Quantity of oil and fatty substances (TS 4786)

6.1.3. Sinking time (Hydrophilicity)

Put together the 5 test samples of approximately 1 g taken from the sample with a clips and weigh 0.01 g together with the basket. The wire basket is left in the beaker at a height of 10 mm to 20 C^o of purified water. When the water touches the water, the stopwatch is activated and the entire sinking period of the cotton is determined. The penetration time of the absorbent cotton should not exceed 10 seconds.

6.1.4. Water holding ability

Put together the 5 test samples of approximately 1 g taken from the sample with a clips and weigh 0.01 g together with the basket. The wire basket is left in the beaker at a height of 10 mm to 20 C^o of purified water. At the end of the experiment, the basket is removed from the water and the water is filtered for 30 seconds. Weigh about 0.01 g in a weighed beaker. Water retention ability is calculated per 1 g mass. Absorbent cotton should be able to hold at least 23 g of water per gram of cotton.

6.1.5. Moisture content

3 g of hydrophilic cotton, which is hand-picked, is weighed precisely in a weighted container. Wait for until fixed weight in a 105-110 ° C incubator. Weight loss is calculated as %. The hydrophilic cotton in the package should not have more than 7% dense moisture.

6.1.6. Lump assay

1 g of hydrophilic cotton is spread between the two glass sheets in the form of cheesecloth and the pellets are counted. A pack is sampled from at least 10 different locations to count lumps and has an average value. It should not contain more than six pellets.

6.2. Plaster (TS 3957)

Plaster is a medical material used to locate dressing material, to close injuries and to keep small areas in immobile, containing cloth or viscose or a mixture of cotton or viscose yarns or woven flat cloths or a homogeneously spread rubber or acrylate based sensitive adhesive on the inner surface of a plastic film.

6.2.1 Physical Controls

1. Appearance

Visually check the patch in your hand to see if it looks smooth and whether the adhesive sticks to the upper surface of the lower layer.

2. Length

Open the plaster completely and calculate whether the length specified in the package is less than 98%.

3. Width

The width of the wrapped plaster is measured from 5 different places of the plaster and the average is taken. The width of the patches with a width of over 5 cm shall not exceed ± 2,5 mm from the width specified in the label and patches with a width of under 5 cm shall not exceed ± 1,6 mm from the width specified in the label.

4. Ability of torn

When the flaster is torn at least one meter, determine whether or not the edge width is maintained at a deviation of ± 1.

5. Number of Weft and Warp

The number of weft and warp threads in 1 cm of cloth is determined, cloth plaster ‘s weft number should not be less than 22 in 1 cm and warp number should not be less 27 in 1 cm.

6.2.2. Adhesion control (TS 3957)

To measure the adhesion of a patch, a strip of 2.5 cm width and 50 cm length is cut. The strip is adhered on a plate made of clean and special steel. Rubber, plastic, metal rolls glued on a 2 kg weight sheet per cm are passed through the plaster at a speed of 30 cm / min three times in both directions. In parallel with the long axis of the plaster, the necessary pulling process is performed. The strength to adhesion of rubber adhesive patches should be less than 0.2 kgf / cm and the strength of acrylate adhesive patches should not be less than 0.18 kgf / cm.

6.2.3. Water vapor permeability

The test is made according to TS 3957. In 24 hour, water vapor permeability for perforated cloth plasters 500 g / m^2, for semipermeable plastic plasters 1000 g / m^2, for permeable plastic plasters should not be less than 2000 g / m^2.

6.2.4. Resistance to water (TS 3957)

To measure the adhesion of a patch, a strip of 2.5 cm width and 50 cm length is cut. The strip is adhered on a plate made of clean and special steel. Keep in water at 23 ^{o}C for 24 hours. Remove from water and then dry. After 10 minutes in the standard atmosphere, the adhesion strength is tested as in the previous experiment. The adhesion strength of semi-permeable and impermeable plastic patches should not be less than 0.16 kgf / cm.

6.2.5. Stretching Control

The force required for 20% extension of plastic plasters should not be more than 1.4 kgf / cm and at the end of the experiment it should not change more than 5% of the initial length when left to itself.

6.2.6. The zinc oxide content of the adhesive

The test is made according to TS 3957 and the zinc oxide content of the rubber-based adhesive base must be at least 10%.

6.2.7. Sterility test

The test is made according to TS 3957 and at the end of the experiment the microorganism should not reproduce.

6.3. Hydrophile Gauze (TS 6077)

6.3.1. Physical Controls

1. Visual inspection

Whether the gauze is clean, white or not and the joint is checked for hole tears.

2. Number of Weft and Warp

Gauze is spread over a contrast ground. The number of weft and warp threads is determined by means of a "lup". The two left edges of the lup are arranged parallel to the yarns to be counted and fit on the right edge of the last yarn. A space and a thread are counted as a thread. The counting should be sensitive to 0.5 yarns. The arithmetic average of the weft and warp frequency values in the unit length gives the average weft and warp frequency of the cloth. The sum of these two values gives the number of yarns in the unit area. These results should be in accordance with the values given in Table 6.1 when determined. The number of wefts should be counted double in some clothes that have double wefts from the same mouth. In this case, there should be fewer than five pairs per cm. At least three experiments are performed for each sample.

Table 6.1. Evaluation of test results of hydrophilic gauzes

Number of warp (at least per cm)	Number of weft (at least per cm)	Unit area mass (at least g / m^2)	Breaking strength (in the direction of warp) (at least kgf)
10	10	24	5
12	10	30	6
12	12	32	6
14	10	32	7

3. Unit area mass

a) The weight of the square meter over a cloth batch: The width and length of the sample, which is at least 0.5 m in length cut from the center of the ball, is measured. Weigh at 0.2% sensitivity. The part size specification should be made with 0.5% sensitivity.

b) With a sample of 10x10 cm weighing in square meters: The cloth is spread flat and without any stretching applied. The metal template diagonals are pressed firmly onto the fabric, parallel to the weft and warp threads. The test sample is cut with the help of a razor blade. The samples are weighed with a sensitivity of 0.2%. The area of the gauze can be calculated. A piece is cut. The balance is weighed and mass is found. This value is calculated and the weight per square meter is calculated.

4. Search of chemical finish

1-2 drops of iodine tincture are applied to at least five separate points on the gas gauze. It is determined whether or not it comes to purple color. Purple indicates the starch.

5. Optical whiteners

The gauze is examined under a UV lamp at a wavelength of 366 nm. It is detected that the fiber carrying or not carrying the shiny or yellowish fiber. Shinny yellowish-looking fibers are indicative of synthetic fiber on optical whiteners.

6.3.2. Chemical Controls (TS 4260)

Preparation of extraction solution:

10 g of gauze is boiled for 15 minutes with 150 ml of purified water. With the help of a clean funnel, the filtrate is transferred to a 250 ml volumetric flask. 250 ml is completed by adding 100 ml more boiled water by pouring over the cloth in the funnel. Experiments are done in this filtrate.

1. Quantity of surfactant

10 ml of extraction solution is transferred to clean and dry glass tube. It is vigorously shaken 30 times within 30 seconds. The tube is rested for 10 minutes. The height of the foam layer on the surface where the liquid comes in contact with the tube wall should not be more than 3 mm.

2. Acidity alkalinity

5 ml of extraction solution is added to clean and dry two tubes separately. Three drops of phenolphthalein are added to the tube one by one and three drops of methyl oranj are added to the other. The tubes are vigorously shaken. It is determined whether or not pink color develops both of tubes. The pH measured in the solutions should not be less than 4,5 and not more than 8,6.

3. Chloride, Sulfate and Calcium ions

20 ml of extraction solution is added to dry and clean three tubes separately. Separately, add 2-3 drops of silver nitrate, 5% w / v silver nitrate, 10% w / v barium chloride and 3% w / v ammonium oxalate solution, respectively, and mix immediately. It is observed whether turbidity occurs or not. No turbidity should be observed when adding silver nitrate, barium chloride. The addition of ammonium oxalate should not cause any blur immediately.

4. Synthetic fiber

Approximately 0.5-0.7 g of gauze weighed with 0.1 mg sensitivity. In 50 ml of $ZnCl_2$ solution (27 g of $ZnCl_2$, 75 ml of formic acid, 15 ml of water) is held for 2.5 hours at 40 ° C in a water bath with frequent agitation. The solvent is finally washed with water until the acid does not react. It is dried until reaching a constant weight. Weight loss should not be more than 0.1%.

5. Dry residue

100 ml extract solution is evaporated to dryness on a water bath. It is dried until reaching a constant weight at 100-105 ^oC. Weigh about 1 g. The dry residue should no further be more than 0.02 g.

6. Color materials (TS 6077)

7. Ether-soluble substances (TS 6077)

8. Assay for Sulphate ash (TS 6077)

6.3.3. Hydrophilicity

A piece of approximately 10 cm^2 which is cut is folded 4 times with the help of a pens. These piece is let go from height of 1 cm to a beaker which contains 1 liter of purified water. The time taken until the yarns are wetted and completely abandon the surface of the water is detected by a chronometer. Determine whether this time is less than 10 seconds or not.

6.3.4. Weight loss with drying

Approximately 5 g of gauze is weighed to a precision of 0.001 g. The sample is dried to a fixed weight of the sample at a temperature of 103 ± 2 ° C in a drying oven. There should not be more than 8% weight loss.

6.3.5. Breaking strength (TS 4260)