

THE USE OF SULFONOMIDES IN WOUNDS

General Considerations - As yet there is no unanimity of opinion as to the efficacy of the sulfonamides when used locally in wounds. It is generally agreed, however, that the best results are obtained when their use is combined with adequate wound care (excision, wound cleansing, etc. - see sections on wound treatment.) Colebrook and other claim that the local use of sulfonamides will:

- 1) Prolong the safe period of wound excision.
- 2) Make delayed primary suture possible.
- 3) Reduce sepsis rate in compound fractures.
- 4) Get healing in plaster without suppuration.
- 5) Improve results in burns.
- 6) Prevent many cases of gas gangrene.

In fact it has been recommended that excision should be carried out, regardless of the time interval since injury, in those cases in which local sulfonamide therapy has been given.

Most authorities agree that the local use of the drug combined with its oral use offers the maximum protection.

Sulfonamides should not be applied to brain tissue because of potential irreversible damage.

Local Use - Crystalline sulfanilamide is preferable because sulfathiazole has a tendency to cake.

Technique of application:

- 1) Cleanse and excise wound.
- 2) Apply sulfonamide - the drug is usually sprinkled over the wound surface, but it may also be applied by packing, by insufflation, or smeared on as a paste.

Dosage - 0.1 gm. per square inch of wound surface.

10.0 gm. maximum for one wound.

20.0 gm. total maximum for all wounds in one individual. 5-20 gm. usual total dose.

- 3) Dress by open method.

Abdominal Wounds:

- 1) 6 to 8 grams of crystalline sulfanilamide into peritoneal cavity before closing.
- 2) If soiling of abdominal wound has occurred during operation - place sulfanilamide crystals in abdominal wound as it is closed - (drainage of wound also advised).
- 3) Continue sulfonamide therapy by parenteral route - 1% solution in physiologic saline - 150 cc. every 6 hours for 4 to 7 days, depending upon condition.

After Dressings

In infected wounds first remove purulent materials by irrigation with physiologic saline, and necrotic debris by irrigation with azochloramide or some similar material every 6 hours until the necrotic material has been removed. Then dust on enough sulfanilamide to frost the wound. This is done every time the dressing is changed.

Oral Therapy

1 gram every 4 hours day and night for 7 days. If the wound is still infected at that time the drug is continued.

Choice of drug

- 1) Streptococcus infections - sulfanilamide
- 2) Staphylococcus infections - sulfathiazole.
- 3) Pneumococcus infections - sulfadiazine.

Usually sulfadiazine is the drug of choice; sulfanilamide is second; and sulfathiazole is third.

USE OF SULFONOMIDES IN WOUNDS IN 12th General Hospital

- 1) All surgical principles of wound care are to be observed.
- 2) Sulfonomides will be considered only in wounds which we feel it unsafe to close.
- 3) Sulfonomides not over the amount recommended by the research council will be put in alternate wounds by the surgeon.
- 4) Those wounds not subjected to local sulfonomide therapy will be treated largely by the method outlined by Trueta and Orr - cleansing and excision done as far as possible, lined with vaseline - soaked gauze, packed with dry gauze, resilient pressure dressing and splint (plaster or other splints to be used).

The two series of cases which will come out of this will be carefully studied to determine if the drug treated series or the series without drugs show up better, or if there is any difference.

SULFONAMIDES

Specific potent therapeutic agents to be used intelligently.

Precautions:

- Hospitalize patient-
- Specific indication for use-
- Bacteriologic diagnosis-
- Previous sulfonamide therapy - reaction?
- Watch for toxic signs-
- Determine before hand: blood picture, liver function, history of blood dyscrasia, renal or liver disease.
- Test dose 5 grains if in doubt.
- Give full therapeutic dosage.

Indications:

- Drug is bacteriostatic and may lower immune body production.
- Organism
 - Hemolytic streptococci (esp. Group A), pneumococcus, gonococcus, staphylococci, meningococci, B. coli, B. Welchii, H. influenza, Friedlanders Bacillus, virus of: lympho granuloma and trachoma.

Methods of administration and dosage:

- Dose same for all sulfonamides.
- Start as soon as diagnosis and indications have been established and give enough to obtain and maintain adequate blood level and maintain until dangers of exacerbation have passed.

Blood level desired:

- Vary from 4-20 mg%.
- Factors:- Drug used - sulfanilamide 4 - 6 mg. %
 - sulfadiazine 10 - 12 mg. %
 - sulfathiazole 10 - 12 mg. %

Severity of Infection:-

- Uncomplicated type I Pneumococcal pneumonia - 4-6 mg % sulfanilamide
- Severe staphylococcus septicemia - 12-16 mg % sulfathiazole
- Meningococcal meningitis - 15-20 mg % sulfanilamide
- Keep up for 2 to 7 days after fever ceases.
- Only true guide is blood level.
- Many variations influence the rate of absorption.

ORAL ADMINISTRATION

- Best for all sulfonamides.
- Plan of exhibiting drugs.
 - Initial dose - 2 to 4 grams. Thereafter - 1 gram every 4 hours day & night
 - Check blood level in 24 hours.
 - If adequate keep up 1 gram every 4 hours until temperature is normal 1 to 7 days.
 - If inadequate increase to 1 1/2 grams every 4 hours until level is adequate.
 - If too high, decrease dose to 1/2 gram every 4 hours or 1 gram every 6 hours.
 - Check blood level thereafter every 48 hours.
(sulfadiazine may often be kept at good level by 1 gram every 6 hours.)
- If no response to drug in 72 hours - stop.
- If toxic signs develop - stop.
- If infection is worse - stop.

SULFONAMIDES

- (For meningitis give sulfadiazine to produce blood level 50% higher than desired spinal fluid level)
- (Sulfathiazole in 5 grain doses 6 to 8 times daily often valuable in urinary tract infection)
- (Sulfanilylguanidine and succinyl sulfathiazole given for local effect or bowel blood level rarely over 3 mg %).

PARENTERAL ADMINISTRATION.

Indications: Patient in coma; severe infection and immediate high blood level imperative; poor absorption from gastro-intestinal tract.

INTRAVENOUS ADMINISTRATION.

1. Sulfanilamide - 1 % soluble in wate or saline (rarely used)
2. Sodium salts or sulfapyradine, sulfathiazole, sulfadiazine in distilled water or saline (never in glucose or blood) 5 % solution.

Dosage:

1. 0.1 gram per kilo (determine blood level)
2. In 8 to 10 hours $\frac{2}{3}$ of above dosage.
3. Continue dose 8 to 10 hours until oral use is possible.

(Where greater dose is required a 25% solution may be used)
(May cause slough, if it gets outside the vein)

SUBCUTANEOUS ADMINISTRATION:

0.5 to 1.0 % solution in normal saline.

TOXIC REACTIONS:

Fairly common, especially with:

- History previous reaction
- Previous sulforamide therapy
- Intra-venous administration
- Large dose
- Taking drug over long period of time.
- Low fluid intake and output

Toxicity from most toxic to least toxic.

Sulfapyradine - sulfathiazole - sulfanilamide, sulfadiazine, sulfaguanidine

Signs and symptoms.

Nausea & vomiting - headache - cyanosis - sore throat - psychosis - oliguria
fever - hemolytic anemia - cardiac irregularity.

Later - rash & conjunctivitis - anuria & nitrogen retention - Hepatitis - agranulocytosis.

Anuria from crystal deposits occurs especially with less soluble lighter acetylated drugs, especially sulfapyradine.

Prophylaxis - Follow blood level carefully

Daily urine

Daily blood count for 5 days - 2 weeks afterward.

B.U.N. and N.P.N. if urine low.

AS TO CHOICE OF DRUGS:

Long tables -

Apparently sulfadiazine or sulfathiazole on first choice for everything.

Except - sulfanilamide for nasopharyngeal streptococcal infection
sulfanilamide for ulcerative colitis
sulfanilamide or sulfadiazine for streptococcal infection of
wounds.

IN URINARY TRACT INFECTIONS:

In general, smaller doses required (45 grains per day)(except for gonorrhoea)

Gonorrhoea - sulfathiazole - 1 gram four times daily for 5 days.

Streptococcal infection - sulfanilamide (except streptococcus fecalis which
does not respond - give mandelic acid)

Staphylococcal infection - sulfathiazole - (neo-arsphenamine for recalcitrant
cases)

Bacillary infections - Mandelic acid

Must react concentration 0.5 % in a highly acid urine (pH 5 or less)

Dose - 4 to 10 tablets or 4 to 6 teaspoonful four times a day.

Restrict fluids to 1000 cc daily.

Acidify urine with ammonium chloride (enteric coated) 15 grains 4 times a day