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Treatment of Mastitis

Using Agents Other Than Antibiotics and Sulfonamides

Earle Douglas

Rotenberg (1953) points out the threat arising from bacterial strains becoming resistant to antibiotics and sulfonamides, and those resistant to such therapy per se, both of which are becoming more prominent in mastitis, with extensive and indiscriminate use of antibiotics and sulfonamides for therapy. Thus a need is expressed for a mastitis treatment that (1) is not an antibiotic or sulfonamid; (2) has a wide antibacterial spectrum with little or no chance for development of resistance or compensation to the drug; (3) is non-toxic and (4) is restricted to use under professional supervision. This need indicates the importance of agents other than antibiotics and sulfonamides. It was thought that a brief review of the recent literature on some of these agents would prove to be interesting and valuable to the writer and reader. Agents used separately or in conjunction with antibiotics or sulfonamides are discussed.

Hydrotherapy

Quite favorable results were obtained when infected quarters were treated by bathing these quarters in swirling water for 15 minutes at 12 hour intervals. A device made of metal fits around an infected quarter. A hose, from a pressure spigot, forces water thorough a special valve causing a swirl around the quarter. The water then flows over the upper rim of the device and drains away.

Just before and after each treatment, the quarter is stripped out. One-half pint to 1 quart of milk was taken on the stripping following the treatment depending on the individual case. The udder was more pliable and indurated areas were more easily detected.

Treatments were tried on 5 groups of quarters and results were as follows:

Group 1. Seven quarters with acute Staphlococcus mastitis. After 4-6 treatments the infective organism was absent, the inflammation had subsided and the quarters returned to normal physical appearance.

Group 2. Four quarters with excessive leucocytes but no bacteria. After 6 treatments the milk returned to normal in leucocyte count and physical appearance. The udder was more pliable.

Group 3. Ten quarters with chronic Streptococcus agalactiae mastitis. After 8 treatments the milk returned to normal, the udder was more pliable and the indurated areas more pronounced and circumscribed. Streptococcus agalactiae was still present.

Group 4. One quarter with chronic Streptococcus agalactiae. After treating with hydrotherapy and penicillin the bacterial check was negative.

Group 5. Three highly acute cases.
5 treatments the milk was normal and the inflammation subsided.

The data are favorable but seem insufficient to draw definite conclusions.

**Novoxil**

Novoxil (silver oxide) is designed for intramammary injection into quarters infected with *Streptococcus agalactiae*. Thus, diagnosis by bacterial culture is very important. Novoxil causes considerable tissue reaction in the udder and should not be used in acute cases. Its greatest value is when the *Streptococci* are being shed, but no symptoms with little udder damage are present.

The stage of lactation is also important. Novoxil is not good to use when animal is in full production and is best in the drying or dry period. In infected dry cows it is recommended that Novoxil be placed in the teat 2-3 weeks before parturition or before the udder becomes tense and leave it in there until lactation. For cows in production, three consecutive injections are usually sufficient with 24, 48 or 72 hour intervals. The recommended dosage is 5-15 cc.

Seventy-five percent of the cases, where inflammatory reaction was present, recovered with Novoxil treatment.

**Iodized Mineral Oil**

Iodized mineral oil in the ratio of 1:1250 gave some favorable results. Best results are obtained in non-lactating udders.

The technique for treating non-lactating udders is to comfortably distend the cistern with the idoized mineral oil. Massage thoroughly and leave in until lactation. However, it may be best to strip out the udder in 15 days and repeat the treatment. Lactating udders should be stripped out, rinsed 1-2 times with the iodized mineral oil, and then inject as for non-lactating udders. Repeat 2-3 times at 24 hour intervals.

The iodized oil was used on cases previously treated with sulfonamides and penicillin separately and combined, proflavine, or no previous treatment. A response to normal was evident in most cases. In *Streptococcus* infections 1 treatment is usually sufficient and in *Staphylococcus* infections 2-3 treatments at 48 hour intervals are necessary.

In only two cases, where 2-3 treatments were used, some irritation of the gland epithelium seemed to occur.

**Hyaluronidase**

Penicillin with hyaluronidase added was used by intramammary infusion to treat mastitis and was compared to penicillin used alone. Where no fibrosis was present, group 1 udders, and in early cases the addition of hyaluronidase speeded up recovery. In cases with fibrosis and group 2 and 3 udders there was no evidence of enhancement.

A product, fibrex, which is hyaluronidase plus other polysaccharolytic enzymes, is supposed to act on fibrotic tissue. It gave very definite benefit in cases where fibrosis was present. With one or two treatments, 95-100 percent of the cases recovered. It apparently helps the antibiotic reach walled-off foci high up in the gland, destroys fibrotic tissue, and permits the gland to heal.

**ACTH**

In a reported case of acute bovine mastitis ACTH appeared to be of great value in promoting recovery. A dosage of 300 veterinary units was equally divided and injected by intramuscular and subcutaneous routes. It alleviated stress and in combination with intensive antibiotic and supportive therapy apparently created a synergistic action which suppressed an otherwise hopelessly severe infection.

**Hydrocortisone**

Hydrocortisone suppresses the phenomena of local tissue reaction and thus reduces the symptoms of inflammation as in acute mastitis. Where pathological organisms are present it should be kept in mind that hormones decrease phagocytic activity of the neutrophils, thus lowering the natural defenses. Thus, the use of hydrocortisone in infectious diseases without adequate antibacterial treatment is hazardous.

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Vigue (1955) found that the addition of steroids, especially hydrocortisone, to adequate amounts of antibacterial agents for treatment of acute mastitis shortens the course of the inflammatory disease and resulted in prompt clearing up of the milk.

The optimal dosage is 50-100 mg. per quarter. It must be used early in the infection to be of value and it shows no value in chronic cases.

Masticort, an antibiotic-sulfonamide-hydrocortisone preparation in a water soluble base, was tested against the same preparation with the hydrocortisone deleted from the preparation. Results indicated that in acute mastitis the convalescent time is reduced by about 25 percent and the percentage of cures is higher by at least 20 percent.

**Oxytocin Factor**

Oxytocin is an aqueous solution of the pressor principle of the posterior pituitary lobe. Its main action is on the uterus, but it has been employed to stimulate milk let down in animals displaying agalactia at parturition.

Schipper (1953) used it alone and in conjunction with antibiotic intramammary infusions for treatment of mastitis. He found that:

1. Oxytocin alone has considerable activity in correcting symptoms of acute mastitis.
2. In chronic mastitis, oxytocin alone demonstrates return of the normal physical appearance to milk without involving the risk of irritation to mammary tissues, development of antibiotic tolerance, or contamination of the milk with medicaments.

Oxytocin empties the milk ducts of inspissate secretions, removes inflammatory debris, retained milk and fibrin clots to support the observation that occlusion of milk ducts is important in the pathogenesis of bovine mastitis.

A dosage of 10-40 units intravenously is recommended.

Smith and Pattison (1954) tried to duplicate the results of Schipper in experimental cases of Streptococcus agalactiae in cows and goats and found an intravenous injection of oxytocin had no effect in the treatment of mastitis. At the dosage employed, a combined therapy of oxytocin and penicillin proved no better than penicillin alone in treating the disease. They felt that their results disagreed with Schipper's, because Schipper did not identify the causative agents, a sufficiently accurate means of measuring the status of disease was not used and no controls were included. Also they found no experimental evidence that the treatment of mastitis by frequent stripping was necessarily beneficial, thereby questioning the advantage of cleaning out the milk ducts.

**Ephedrine**

Ephedrine hydrochloride is an agent having strong sympathetic action of rather prolonged duration and exhibiting little or no toxic tissue reactions. Absorption from the udder is slow, sustaining activity over a longer period of time than administration by any other route.

Ephedrine hydrochloride and penicillin were combined in an intramammary infusion for treatment of acute mastitis of sheep and cattle. The ephedrine showed marked activity in reducing congestion and swelling of affected udders. *In vitro* studies showed the ephedrine hydrochloride had a detrimental effect on the inhibiting action of penicillin on the growth of *Micrococcus* isolated from bovine udders.

**Mercosterol**

This therapeutic agent is a mercuriated sterol in a light mineral oil. Clinical experience seems to indicate that this product should satisfy the criteria mentioned in the introduction.

First, it is not just another antibiotic or sulfonamide but is a lipid in itself with the tendency to float on the milk instead of being absorbed like a water-solution material, thus attaining and maintaining close contact with the infected areas.

Secondly, the preparation is effective against a far more extensive antibacterial...
spectrum than shown by other agents. Experiments, in vitro, have demonstrated that the product is bactericidal and bacteriostatic against Staphlococcus aureus, Staphlococcus albus, Bacillus subtilis, Pseudomonas aeruginosa, Actinobacillus lignieresi, Corynebacterium xerosis, Shigella flexneri, Salmonella schottmulleri, Lactobacillus acidophilus, Mycobacterium, Pasteurellus multocida, Escherichia coli, Brucella bronchiseptica, Streptococcus pyogenes as well as many others. In 52 cases of bovine mastitis treated, excellent reults were obtained in 49 of the cases. Twenty of the cases were Streptococcus infections, 27 were Staphlococcus infections, 3 were E. coli infections, 2 were non-identified toxic generalized mastitis. Three of the cases were chronic and it was assumed that no agent would have cured them.

There was no evidence of general or local reactions to the agent indicating a lack of toxicity. Also the milk contained no detectable mercury after 12, 36, and 72 hours.

The usual dose was 10 cc. instilled into the infected quarter either once or twice daily and the average length of treatment was 3 days.

**Furacin**

Mires (1950) used 25 cc. of 0.2 percent furacin in water and polyethylene glycols, in more than 10,000 cows. In acute clinical mastitis 78 percent of the cases recovered and in dry cows with a history of mastitis in the previous lactation period 90 percent of the cases showed good results.

Kakavas et. al. (1951) stated that penicillin and furacin together produced an additive effect. They used 0.2 percent furacin in carbowax and added penicillin so as to have 2,000 units per cubic centimeter. A dose of 25 cc. of the mixture was used in each quarter.

The mixture was found to be an effective chemotherapeutic agent in the treatment of chronic and acute forms of bovine mastitis. It showed bacteriocidal qualities against Streptococcus agalactiae and other Streptococci, Staphlococci, Escherichia coli, and Pseudomonas aeruginosa. It showed no irritation to the udder.

Simon and Schmidt (1952) found that:

1. One hundred thousand units of crystalline penicillin-G, potassium salt, in 10 ml. of penicle, a water-in-oil type vehicle, was superior to 40 ml. of furacin solution for treatment of Str. agalactiae mastitis.
2. A mixture of 40 ml. of furacin solution and 100,000 units of crystalline penicillin-G, potassium salt, was not superior to 100,000 units of crystalline penicillin-G potassium salt in 10 ml. of penicle for treatment of Str. agalactiae mastitis.
3. A synergistic action in vivo between furacin and penicillin was not demonstrated.

**SUMMARY**

Recent literature on some agents other than antibiotics and sulfonamides used in the treatment of mastitis is reviewed briefly.

1. Hydrotherapy which consists of bathing the affected udder in swirling water gives favorable but inconclusive results in the treatment of Streptococcus agalactiae and Staphlococcus mastitis.
2. Novoxil (silver oxide) as an intramammary injection produces recovery in quarters infected with Streptococcus agalactiae. Best results are obtained when Novoxil is used in chronic cases during the dry or drying periods.
3. Iodized mineral oil by injection into non-lactating udders produces good results in Streptococcus and Staphlococcus udder infections.
4. Hyaluronidase when added to antibiotics for treatment of mastitis appears to hasten recovery.
5. ACTH when used in conjunction with antibiotic treatment seems to be of value by alleviating stress.
6. Hydrocortisone when mixed with antibiotics and sulfonamides hastens recovery and increases percentage of recovery.

*Mastitis* (continued on page 121)

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Dr. R. A. Telleen has a general practice at Jefferson, Iowa. He is Committee­man of the local Boy Scout Troop. A special interest is a partnership concerned with the breeding of Dachshunds. The Telleens have one child: Teresa Jo, age 2 years.

Dr. James R. Rosdail has a general practice at Pomeroy, Iowa. Professional positions include membership of the Ex­ecutive Board of the North Central Iowa Veterinary Medical Association, a member of the Membership Committee of the State Association, and past president and Secretary of the Coon Valley VMA. Dr. and Mrs. Rosdail have five children: Jay, 6½, Gail, 5; Jan, 4; Joy, 2; and Leanne, 1.

Dr. Lee R. McGregor is located at Salem, South Dakota, where he has a general practice. He is Chairman of the Methodist Church Board, Chairman of the Local Shrine Circus Ticket Sales, and local Salvation Army Drive Chairman. Doctor and Mrs. McGregor have two children: Connie Lee, age 4½ years; and Nancy Ann, age 3 years.

Dr. Dale E. Kelley is living at 202 Jackson St., Sauk City, Wisconsin. He and his partner, Dr. R. L. Winans, Minn. '54, have a dairy practice. Doctor Kelley is President of the Dane County Veterinary Medical Association. Community work includes the offices of Vice-President of the Sauk County Bowling League and Commander of the American Legion Post. Within the next 3 years he hopes to have a veterinary hospital.

Remainder to appear in next issue.

*Mastitis* (continued from page 88)

7. Oxytocic factor, intravenously, promotes let-down of milk and removes debris from milk ducts, but the value of this in mastitis treatment is questioned by some research workers.

8. Ephedrine when used with penicillin by intramammary infusion apparently aids in reducing congestion and swelling.

9. Mercosterol, a mercuriated sterol, is bacteriocidal and bacteriostatic against a wide spectrum of bacteria and gave excellent results in the treatment of several cases of mastitis.

10. Furacin alone or in combination with penicillin as intramammary infusion is an effective agent in the treatment of acute and chronic mastitis.

LITERATURE CITED


