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Popular Article

Understanding the Impact of Chemical Sterilization: Insights into Benefits and Risks for Canine Population Management

Parikunwar L Parmar

M.V.Sc, Kamdhenu University, Gujarat

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Using inorganic chemo-sterilant for male dogs presents an attractive alternative as it eliminates the drawbacks and expenses associated with surgical sterilization and the subsequent care needed post-operation. Moreover, in regions where surgical castration of male dogs is not culturally accepted (e.g., Romania, the Bahamas), chemical castration provides a viable alternative (Garde et al., 2016). Therefore, chemical castration could prove to be an appealing option for developing countries with limited resources for implementing surgical dog management programs (Garde et al., 2016). Chemical sterilization methods utilized thus far encompass hormonal approaches, immunocontraceptives, and inorganic chemo-sterilants like CaCl_2 , zinc gluconate neutralized by arginine (Neutersol), and NaCl solution (Kutzler and Wood, 2006).

1. Hormonal method

In 2006, a nafarelin implant, known as Gonazon, containing a dose of 18.5 mg, was introduced to the European market. This compound is administered in the umbilical region for dogs and in the neck for cats (Gobello, 2012). Another formulation of a GnRH agonist is available as the Suprelorin implant, which contains a GnRH analogue called deslorelin. Its functionality is similar to that described above, but it is currently only approved for temporary chemical castration of male dogs. Off-label usage has indicated that the drug can also be effective for the long-term prevention of heat in female dogs. However, it's common to observe an initial heat shortly after the implant is inserted due to the flare-up effect (Fontaine and Fontbonne, 2011).



2. Zinc gluconate neutralized with arginine (zeuterin)

In Male dogs – Two intratesticular injectable formulations are known to sterilize male dogs. **Zeuterin** was approved by the United States Food and Drug Administration (FDA) for permanent sterilization of male dogs ages three months and older by causing necrosis of the testicle. It is not currently available commercially.

3. Calcium chloride:

Calcium chloride dissolved in a variety of diluents have also been studied, with the majority of research and most promising results using calcium chloride dissolved in ethyl alcohol. Calcium chloride formulations can be purchased for use in animals from compounding pharmacies, but the use of calcium chloride for sterilization of males is not approved by the FDA or any other international regulatory agency (Leoci 2014)

Dosage and testicular width with their dose per testicle (Seid <i>et al.</i> 2019)		
Sr. no.	Testicular width	Dose per testicle
1	10-14 mm and sexually mature adult cats	0.25 ml
2	15-18 mm	0.5 ml
3	19-22 mm	0.8 ml-1ml
4	23-24 mm	1 ml-1.5 ml
5	25-26 mm	1.5 ml-2 ml
6	27 mm	1.5 ml-2.5 ml

4. Hypertonic Sodium Chloride (NaCl)

Sodium Chloride Solution, also known as hypertonic saline, is an affordable and easily administered solution. Research has shown that its use results in severe degenerative changes in testicular seminiferous tubules and significant infiltration of immune cells in the testicular tissue. Intratesticular injection of hypertonic saline appears to be a potential alternative method in the future, offering advantages over traditional approaches such as orchiectomy and medical castration.

Advantage of non-surgical castration methods

An ideal chemical sterilizing agent would effectively halt spermatogenesis, androgenesis, and libido without inducing toxic or adverse side effects (Wiebe *et al.*, 1989). Chemical castration offers numerous advantages, including reduced pain and stress, as well as the elimination of complications such as hemorrhage, hernia, infection, and myiasis commonly associated with surgical procedures



(Ibrahim et al., 2016). Moreover, it is well-suited for large-scale sterilization efforts due to its simplicity, affordability, and ease of administration (Ibrahim et al., 2016). This approach could lead to cost and time savings, allowing animal welfare organizations to sterilize more animals or allocate resources to other critical projects aimed at saving lives. Additionally, chemical castration provides an alternative for pet owners who prefer sterilization without surgical intervention. The combination of low cost, ease of use, and cultural acceptance, especially in regions with limited clinical facilities or trained personnel, makes inorganic chemo-sterilants a valuable asset for large-scale sterilization campaigns.

Disadvantages

Chemical injections for sterilization can lead to documented side effects. Dogs typically experience pain in the scrotum for three to five days following the injections, accompanied by swelling, redness, and irritation. Temporary lethargy and diarrhea are also known side effects.

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