Assessment of a Novel Procedure to Reverse Mouse Penile Prolapses

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Background and Significance

Little is known about the pathogenesis of penile prolapses in male mice used in biomedical research. The current standard of care is to maintain tissue health with daily lubrication in the hope of spontaneous resolution. Without timely resolution, unfavorable outcomes include chronic maintenance or euthanasia.

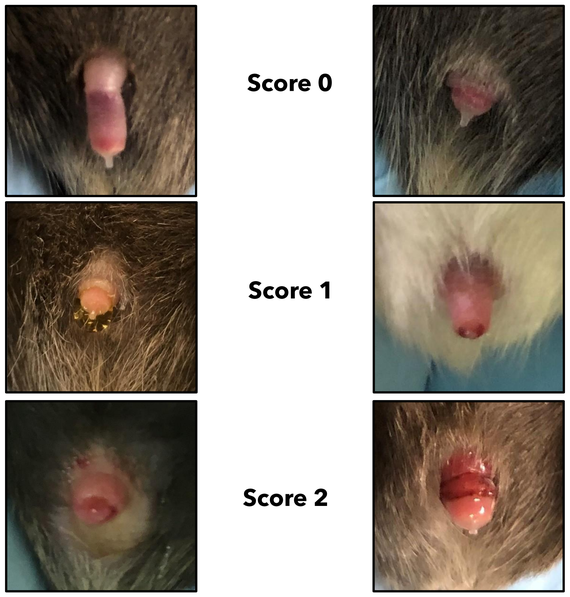
Goals

In an attempt to reverse the condition, we developed a novel and non-invasive procedure that uses a lubricated stainless-steel probe to reinsert the penis into the prepuce. The goals of this study are to:

- Assess the success of a novel technique of reinserting penile prolapses.
- Determine the impact of a steroid containing lubricant to aid in reinsertion.

Scoring of Penis Health

Score	Tissue Health
0	No inflammation or trauma; healthy tissue.
1	Mild inflammation or trauma; pink, dark pink or red tissue
2	Moderate inflammation and/or trauma; white/grey tissue



Penis Anatomy

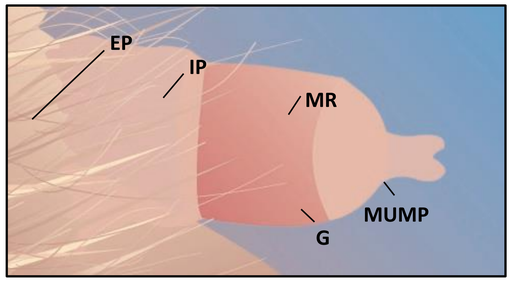


Figure 1: MUMP, male urogenital mating protuberance; MR, MUMP ridge; G, glans; IP, internal prepuce; EP, external prepuce

Figure 2: Side view showing the structure of the penile body inside the external prepuce.

Materials and Methods

Following researcher consent, 23 penile prolapse cases identified, from January 2020 to September 2020, were enrolled in this study.

Physical exam was performed to contribute to a severity-based scoring system:

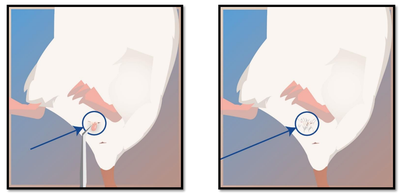
1. Body condition
2. Genital health
3. Presence of comorbidities (congenital conditions)
4. Breeding status
5. Age

Experimental Treatment: All mice had their penises reinserted manually using "mall probe and seeker." To determine if the lubricant used to reinsert the penis had an effect, mice were randomly assigned into two treatment groups.

1. Sterile lubricant
2. Ophthalmic Triple Antibiotics Ointment + Dexamethasone

Regulatory Considerations

All treatments were managed under veterinary care and reinsertion was performed as a veterinary treatment. Thus, all mice enrolled in the study were kept on the investigators IACUC protocol maintaining the mice within their active research study during the therapy trial. Researchers were able to use the animals as intended in their protocol throughout the treatment since the animals were kept in their home cage and regular housing room.

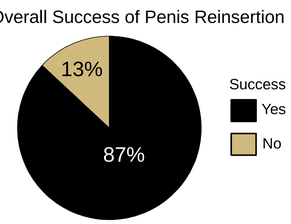


Novel Reinsertion Technique

1. The mouse is scruffed and restrained using a one-handed technique.
2. The external prepuce is pulled back to ensure there is no foreign material present.
3. If debris or foreign material is seen, it is gently removed prior to reinsertion.
4. The lubrication is applied to the penis and prepuce and the animal is left alone in a contained area for 1-2 minutes to allow time to moisten the tissue.
5. The probe is then used to tuck the penis back into the prepuce.
6. If the animal tenses up this can push the tissue back out but once the animal has relaxed it can be gently reinserted.
7. Once the penis is fully inside the probe can be inserted into the prepuce to ensure correct position.
8. Additional lubrication is applied topically to keep the tissue moist.

Note: Check the animal the following day. If the first attempt at reinsertion was not successful, the procedure may be repeated up to 3 times.

Results



Results Continued

Three key health factors can help determine whether this treatment would be successful:

1. Presence of internal prepuce inflammation
2. Trauma to the penis
3. Pre-existing congenital condition

Reinsertion Success by Penile Health Score			
Score	Successes	Cases	Success Rate
0	10	10	100%
1	6	7	86%
2	4	6	67%

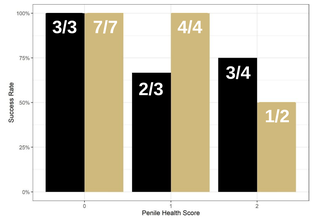


Figure: Success rate of penis re-insertion for each treatment group and penile health score.

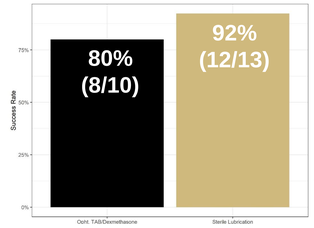


Figure: Success rate of penis re-insertion for each treatment group, independent of penis health score.

- 4 mice had prolapses needing repeated reinsertions with 2 of those successful after up to 3 attempts.

Conclusions

- Manual reinsertion appears to be successful in all cases except where trauma and moderate inflammation are present.
- There appeared to be no difference between steroids and sterile lubricant in maintaining the penis after reinsertion.
- Murine penile prolapses are a multifactorial condition requiring additional investigation into contributing factors and effective treatments.
- Case enrollment continues to further validate this novel technique which will ultimately reduce the number of animals used in research.

Acknowledgements

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