

IS IT SAFE TO REUSE A SYRINGE OF GLUTARALDEHYDE CROSS-LINKED COLLAGEN? A MICROBIOLOGICAL STUDY

PATRICK J. CULLIGAN,* RAYMOND RACKLEY, SUMANA KODURI, RICHARD B. THOMSON,
LYNN SCHWABE AND PETER K. SAND

From the Evanston Continence Center, Northwestern University Medical School, Evanston, Illinois, and Cleveland Clinic Foundation, Cleveland, Ohio

ABSTRACT

Purpose: We evaluated the safety of saving partially used syringes of glutaraldehyde cross-linked collagen for subsequent treatment sessions in an individual.

Materials and Methods: After periurethral injection in an office setting 56 partially used syringes of glutaraldehyde cross-linked collagen were stored in a refrigerator for 1 to 61 weeks (mean 15). Collagen from all 56 syringes was then cultured qualitatively using a broth medium at 35C and semiquantitatively using a chocolate agar plate at 22 to 30C for 5 days each.

Results: A qualitative broth culture was positive for coagulase negative staphylococcus but the results of semiquantitative chocolate agar culture of material from the same syringe were negative. All cultures of the other 55 syringes were negative.

Conclusions: The positive culture most likely resulted from contamination during periurethral injection or the culturing process. Minimal contamination from and the great potential cost savings of reusing glutaraldehyde cross-linked collagen for subsequent treatments in an individual indicate the need for an expanded study involving multiple centers.

KEY WORDS: urethra, urinary incontinence, collagen, syringes, equipment reuse

Glutaraldehyde cross-linked collagen is a sterile, nonpyrogenic, purified, bovine dermal collagen that is dispersed in phosphate buffered physiological saline. This material is widely used as a periurethral bulking agent to treat genuine stress incontinence due to intrinsic sphincter deficiency. It is available commercially in 2.5 ml. syringes costing approximately \$315 each. Multiple injection sessions are usually required to cure or significantly improve incontinence. In a retrospective study of 187 women Herschorn et al noted that a mean of 2.5 treatment sessions (range 1 to 10) was needed to achieve cure or improved incontinence with a mean of 3.8 ml. or 1.5 syringes of collagen injected per session.¹ In large studies Haab et al² and Appell³ observed similar findings. Because of the need for multiple injection sessions, a significant amount of collagen often remains in a syringe after achieving adequate coaptation of the urethral lumen. If such partially used syringes were labeled and stored for future use in the same patient, significant cost savings would result.

MATERIALS AND METHODS

Between January 1998 and March 1999 we saved all partially used syringes of glutaraldehyde cross-linked collagen used for periurethral injection in an office setting in women with no urethral hypermobility in whom urodynamics diagnosed intrinsic sphincter deficiency. The technique of periurethral injection was similar for all samples. During the injection session only the endoscopist and assistant handled the syringes, which were removed from the refrigerator immediately before use. Sterile technique was applied throughout each treatment session.

With the patient in the lithotomy position the urethral meatus was prepared with povidone-iodine solution, 3 ml. of 2% lidocaine jelly were instilled into the urethra and 1% lidocaine was used to anesthetize the length of the urethra at

the 3 and 9 o'clock positions. The assistant attached a 22 gauge spinal needle to the 2.5 ml. collagen syringe. This needle was inserted periurethrally and then advanced suburothelially under direct urethroscopic control to the level of the bladder neck. With the bevel of the spinal needle oriented toward the urethral lumen collagen was superficially injected with resultant bulging of the urothelium medially into the urethral lumen. To avoid contamination of the collagen in the syringe only positive pressure was applied to the syringe during injection. Initially injection was usually done at the 4 and 8 o'clock positions until urethral lumen coaptation was visually confirmed. Injection was repeated using an identical technique at the axial position indicated by urethroscopic examination. When the injection was complete, the spinal needle was removed from the syringe and the assistant recapped the syringe with its rubber stopper. The syringes were then labeled and refrigerated again within 5 minutes of use.

Material from all 56 syringes was cultured at 1 session. Mean time from injection to the culturing session was 15 weeks (range 1 to 61). None of the syringes was beyond the original expiration date at the time of culture. Approximately 1 ml. of material from each syringe was inoculated into aerobic broth culture and incubated at 35C for 5 days. In addition, approximately 0.5 ml. of material from each syringe was inoculated onto a chocolate agar plate and incubated at 22 to 30C for 5 days. Of the 56 syringes 15 did not contain enough remaining collagen to perform each culture. In these cases a nonbacteriostatic saline solution was irrigated into the syringes and used for the broth and chocolate agar cultures.

RESULTS

Broth culture was qualitative in nature to identify the presence or absence and type of bacteria but not colony count. Chocolate agar cultures identified not only the type of bacteria, but also the colony count. Broth culture was positive for coagulase negative staphylococcus in 1 of the 56 syringes but

Accepted for publication May 12, 2000.

* Current address: Department of Obstetrics and Gynecology, University of Louisville Health Science Center, 315 East Broadway, Suite 4002, Louisville, Kentucky 40202.

followup chocolate agar culture of that syringe was negative. The culture positive syringe was stored in the refrigerator for 10 weeks before culture and was 1 of the 15 that required saline solution irrigation to obtain a usable amount of material for culture. As followup of this positive culture the syringe was again irrigated with nonbacteriostatic saline, and broth and chocolate agar cultures were repeated. These followup cultures were negative.

DISCUSSION

Glutaraldehyde cross-linked collagen is a popular, safe and effective periurethral bulking agent for treating genuine stress incontinence primarily due to intrinsic sphincteric deficiency without urethral hypermobility. This material is available commercially only in 2.5 ml. increments and it has a shelf life of 36 months when stored properly at standard refrigeration temperature. While prolonged storage at room temperature decreases the half-life of glutaraldehyde cross-linked collagen,⁴ we believe that 1 or 2 brief exposures to room temperature do not affect material integrity when all such handling is done before the last day of the labeled expiration month. However, to our knowledge no literature is available on the integrity of this material after room temperature exposure and repeat refrigeration.

Clinicians frequently achieve urethral coaptation without completely emptying the syringe of collagen. In these cases they must decide whether to inject the remaining material more laterally or discard it. We evaluated the potential of another option for these partially used syringes, that is retaining them for subsequent injection in the same individual. This protocol seems feasible if repeat injection with a partially used collagen syringe would not increase the risk of infection in these patients.

The cultures in our study support the growth of aerobic and facultative anaerobic bacteria only. Since there was a limited amount of material in each syringe, we did not perform

comprehensive cultures for unlikely pathogens such as viruses, strict anaerobes and yeast. During the culturing session 15 partially used syringes did not contain enough material to inoculate the broth and chocolate agar media, and they were irrigated with nonbacteriostatic saline solution to provide enough material for culture. This process was done on the syringe with positive culture results. That fact combined with 3 subsequent negative cultures of the same syringe indicates that the coagulase negative staphylococcus cultured may have resulted from contamination during culturing. Ideally a control group of unused glutaraldehyde cross-linked collagen syringes would have been cultured for this study but budget constraints made it impossible.

CONCLUSIONS

Retaining partially used syringes of glutaraldehyde cross-linked collagen for subsequent treatment sessions in an individual would result in significant savings. Our study provides evidence that reusing these syringes in this manner may be safe. However, further investigation involving larger numbers, multiple centers and various injection techniques is warranted to confirm the safety of reusing this equipment. If glutaraldehyde cross-linked collagen were available in smaller increments, similar savings would also be possible.

REFERENCES

1. Herschorn, S., Steele, D. J. and Radomski, S. B.: Followup of intraurethral collagen for female stress urinary incontinence. *J Urol*, **156**: 1305, 1996
2. Haab, F., Zimmern, P. E. and Leach, G. E.: Urinary stress incontinence due to intrinsic sphincteric deficiency: experience with fat and collagen periurethral injections. *J Urol*, **157**: 1283, 1997
3. Appell, R. A.: Collagen injection therapy for urinary incontinence. *Urol Clin North Amer*, **21**: 177, 1994
4. Product Information, PI-3141. Covington, Georgia: C. R. Bard, Inc., 1995