

THE PLACE OF STEROID-ANTIBIOTICS AND EARLY BOUGIENAGE COMBINATION IN THE TREATMENT OF CAUSTIC ESOPHAGEAL BURNS IN CHILDHOOD*

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The accidental ingestion of caustic substances, despite efforts in prevention, is a worldwide common childhood problem¹. If the esophagus is burned following caustic ingestion, the management is directed towards prevention of stricture formation. Unfortunately, a standard treatment protocol preventing stricture formation has not yet been established, and different therapeutic approaches are advised².

The combined use of steroids, antibiotics and early bougienage (SAEB) is one of the currently advised treatment protocols^{3,4}. On the other hand, experimental and clinical studies utilizing this protocol have shown both a further decrease in stricture formation and strictures that are dilatable via the anterograde route, but conversely perforations without any beneficial effect⁵⁻¹⁰.

Our purpose in this study is to evaluate the treatment protocol which includes steroids, antibiotics and early bougienage in our clinical material.

Material and Methods

Between 1976-1985, 31 patients who had mucosal penetrating esophageal burns had been treated with SAEB in the Department of Pediatric Surgery at Hacettepe University Children's Hospital. Of the 31 patients treated, 29 were younger than five years of age (93%). There were 16 females and 15 males.

The diagnosis of mucosal penetrating esophageal injury was established by esophagoscopy examinations using a rigid esophagoscope under general anesthesia. There was a history of caustic substance ingestion.

The treatment which began within 48 hours following caustic ingestion consisted of penicillin G 150000 U/kg/daily, gentamicin 6 mg/kg/daily or tobramycin 4

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mg/kg/daily for ten days, prednisolone 2 mg/kg/daily and bougienage with mercury filled Hurst dilators administered under general anesthesia twice weekly. Dilatations were performed by different physicians who were of various levels of training and experience. Steroid and bougienage were continued for a month. Then, esophagographic and esophagoscopy studies were carried out. If a stricture was diagnosed, bougienage was continued, and patients who had no strictures were followed up periodically for one year.

The hospital records of the patients were evaluated retrospectively, and the caustics ingested, complications and outcomes were recorded.

Results

The caustics ingested consisted of acids in 12, caustic soda preparations in nine, benzalkonium chloride (10%) in seven, and bleaching agents, ammonia and lime in the remaining three patients (Table I).

Bougienage perforations occurred in two patients, both being injured following caustic soda ingestion. One of the perforations resulted in the death of the patient. Despite the treatment, in seven of the remaining eight caustic soda

TABLE I: The Results of Treatment According to the Caustics Ingested

Caustics	Number of Cases	Strictures	Perforations	Exitus
Acids	12	3	—	—
Caustic soda	9	7	2	1
Benzalkonium chloride	7	—	—	—
Bleaching agent	1	—	—	—
Ammonia	1	—	—	—
Lime	1	—	—	—
Total	31	10	2	1

ingestion cases, and three of 12 acid ingestion cases, the strictures became complicated within 30 days following admittance.

While three patients, who developed strictures following acid ingestion, were treated by antegrade dilatations, seven stricture cases following alkali ingestion required gastrostomy and retrograde dilatations.

Discussion

The treatment of caustic esophageal burns is still controversial. Various treatment protocols have been advised. Comparison of the results of various or like treatment protocols is difficult, because the extent of burns may differ widely and there are no control studies¹¹.

The combined use of SAEB is one of the advised treatment protocols^{3,4,12}. No complications and the absence of strictures and just eight strictures in 36 severe burn patients also having no complications have been reported by various authors^{3,4}. On the other hand, an experimental study revealed no further decrease in stricture formation, but a higher incidence of perforation with the SAEB combination when compared to steroid and antibiotics⁷. The clinical use of SAEB was also reported to result in an increased incidence of perforations; five perforations among 12 patients and three perforations among three patients have been reported^{8,9}.

Esophageal burns are graded according to their esophagosopic appearance. Since the esophagoscope is not passed beyond the first burned area, it is not possible to define the exact depth by means of the esophagoscope; the degree of the first injury encountered is not a reliable index¹³. Therefore, we instituted the treatment protocol in patients with mucosal penetrating injuries.

There were no resultant strictures following burns due to caustics other than strong alkali and acids. The incidence of stricture formation due to these caustics is known to be low, and they are not considered in the same class with strong alkalies and acids^{9,14}. Only three of 12 cases of acid ingestion had developed strictures which responded to antegrade dilatations. Acids cause coagulation of the surface tissues so that deep penetration, and as a result stricture formation is less likely to occur¹⁰. Since there was no control group, it was difficult to determine whether these results were the natural course or the preventive effect of the treatment. In spite of bougienage during steroid treatment, which was reported to be a factor increasing the risk of perforation, there were no perforations in these patients^{2,15}.

Strong alkalies produce injury by liquefaction necrosis². Thus extensive burns commonly result. The treatment of patients, who had ingested a strong alkali, resulted in two bougienage perforations that caused the death of one patient and

seven strictures in the remaining eight patients. Esophageal perforations should be related to the extent of esophageal damage rather than steroid therapy. The therapy did not prevent stricture formation nor did it have a beneficial effect on continuing antegrade dilatations following strong alkali ingestion.

In the treatment of esophageal burns due to caustics other than strong alkalies, SAEB might have a preventive effect against stricture formation, in addition to its being harmless; the SAEB protocol might have a role in the treatment. If the dilatations are performed by different physicians, the SAEB treatment carries a risk of perforation without preventing strictures after strong alkali ingestion. One of the other treatment modalities such as the use of an intraluminal stent, which is reported to result in a better outcome, may be preferred¹⁶.

Summary

The results of treatment using steroids, antibiotics and early bougienage combination in 31 patients with mucosal penetrating caustic esophageal burns were evaluated retrospectively. In 10 patients, who ingested caustics other than strong alkalies and acids, there were no strictures and no complications. In 12 acid ingestion cases, there were no complications, but three strictures. In nine patients, who ingested caustic soda, there were two perforations, one of which resulted in death. There were strictures in seven of the remaining eight patients. Therefore, the combined use of steroids, antibiotics and early bougienage is suggested to be of limited value after strong alkali ingestion.

REFERENCES

1. Buntain WL, Cain WC. Caustic injuries to the esophagus: a pediatric overview. *South Med J* 74:590, 1981.
2. Goldman LP, Welgert JM. Corrosive substance ingestion: a review. *Am J Gastroenterol* 79:85, 1984.
3. Fyfe AH, Auldrie AW. Corrosive Ingestion In children. *Z Kinderchir* 39:229, 1984.
4. Marshall F II. Caustic burns of the esophagus: ten-year results of aggressive care. *South Med J* 72:1236, 1979.
5. Burford TH, Webb WR, Ackerman L. Caustic burns of esophagus and their surgical management: clinico-experimental correlation. *Ann Surg* 138:453, 1953.
6. Estrera A, Taylor W, Mills LJ, Platt MR. Corrosive burns of the esophagus and stomach: a recommendation for an aggressive surgical approach. *Ann Thorac Surg* 41:276, 1986.
7. Haller JA, Bachman K. The comparative effect of current therapy on experimental caustic burns of the esophagus. *Pediatrics* 34:236, 1964.
8. Kirsh MM, Peterson A, Brown JW, et al. Treatment of caustic injuries of the esophagus: a ten-year experience. *Ann Surg* 188:675, 1978.
9. Oakes DL, Sherck JP, Mark JB. Lye ingestion. Clinical patterns and therapeutic implications. *J Thorac Cardiovasc Surg* 83:194, 1982.
10. Webb WR, Koutras P, Ecker RR, Sugg WL. An evaluation of steroids and antibiotics in caustic burns of the esophagus. *Ann Thorac Surg* 9:95, 1970.

11. Haller JA Jr, Andrews HG, White JJ, et al. Pathophysiology and management of acute corrosive burns of the esophagus: results of treatment in 285 children. *J Pediatr Surg* 6:578, 1971.
12. Daly JF, Cardona JC. Corrosive esophagitis. *Am J Surg* 93:242, 1957.
13. Symbas PN, Vlasis SE, Hatcher CR Jr. Esophagitis secondary to ingestion of caustic material. *Ann Thorac Surg* 36:73, 1983.
14. Hawkins DB, Demeter MJ, Barnett TE. Caustic ingestion: controversies in management. A review of 214 cases. *Laryngoscope* 90:98, 1980.
15. Bikhazi HB, Thompson ER, Shumrick DA. Caustic ingestion: current status. A report of 105 cases. *Arch Otolaryngol (Chicago)* 89:112, 1969.
16. Mills LJ, Estrera AS, Platt MR. Avoidance of esophageal stricture following severe caustic burns by the use of an intraluminal stent. *Ann Thorac Surg* 28:60, 1979.