Looking into swallowing problems

Barium fudge makes the epiglottis visible in young patients at UCLA's School of Medicine

by Jeanne Bockel

The phenomenon of swallowing has become the subject of increasing attention in recent years. Such difficulties are frequently seen in children and adults with orthodontic problems as well as a range of neuromuscular complications. In these cases, a detailed picture of abnormal chewing and swallowing mechanism is critical if the physician is to initiate effective speech therapy or conditioning, or oral surgery if it is indicated. For lack of a satisfactory contrast agent that would make X-rays of this complicated process possible, physicians have been frustrated in their attempts to evaluate swallowing disorders.

High-speed, high-detail cineradiography (motion picture X-rays) and new magnification techniques have made it possible to analyze in detail lip and tongue motions, jaw action, soft palate and airway behavior without the need for a contrast agent. But an agent is required for a detailed picture of the swallowing process, and as yet none has been found.

For most purposes barium is a satisfactory contrast agent. It outlines and defines areas, organs and functions not ordinarily visible in X-ray or fluoroscopic studies. It is nearly always swallowed in liquid form. But a team of pediatricians and radiologists at the University of California at Los Angeles School of Medicine, trying to use it to define the organs and functions involved in swallowing, have found that liquid barium moves too fast out of the mouth and down the gullet to permit X-rays, even though high-speed motion picture X-rays are used to examine the action. Thick barium is too soft and unpalatable. Nor are other contrast media such as aerosols and marshmallows much better. Neither of those will stick evenly to the sides of the epiglottis long enough to permit the taking of X-rays.

To overcome the problem, Drs. Jacqueline A. Morgan and Michael T. Gyepes, pediatricians, and Margaret H. Jones and Donald T. Desilets, radiologists, devised a chocolate fudge containing barium powder. According to Dr. Gyepes, the preparation has an even consistency and is readily accepted by either children or adults, an important factor.

The researchers, who used the fudge in children with cerebral palsy, say it usually takes 15 to 45 seconds to chew a tablespoonful. This is ample time to obtain long cinestrips at various speeds. Two to three teaspoonfuls are usually enough to study the chewing mechanism from the front, rear and side aspects.

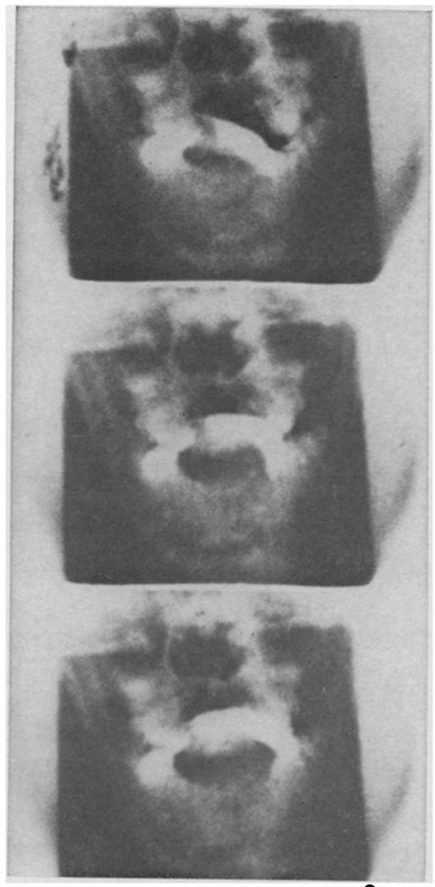
They found that the barium fudge coats the hard palate and upper surface of the tongue, thus allowing biting and lip and tongue motions to be recorded. It also permits detailed study of the lower jaw's motion and the relation of that motion to the tongue and palate.

In addition, the fudge goes down slowly enough to allow detailed X-ray pictures of intake, chewing and swallowing for a thorough analysis of the relative dynamics of tongue and palate.

"What is more, the youngsters like it," says Dr. Gyepes.

The researchers believe the technique is applicable not only to the problems of cerebral palsy but to many other eating-chewing-swallowing-type abnormalities. It might have extensive application in orthodontics and reconstructive oral surgery, they say.

The scientists are in the process of applying the recipe and the technique to a study of a range of abnormalities. They are also interested in patients who have no chewing or swallowing abnormalities, to analyze and define normal chewing and swallowing patterns for various age groups. □



Gyepes

X-rays show mouth, throat motions.

Recipe for chocolate barium fudge:

- ½ lb. (or 4 cups) miniature marshmallows
- 1 small can (⅔ cup) evaporated milk
- ¼ cup butter
- 1½ cups sugar
- ¼ teaspoon salt
- 1 large packet (12 oz.) chocolate chips
- 1 teaspoon vanilla
- 12 level tablespoons powdered barium

Method: Place marshmallows, milk, butter and sugar in saucepan and cook, stirring continuously. After the mixture commences to boil, continue boiling for 5 minutes over medium heat, stirring constantly. Remove from heat and add chocolate chips, stirring the while until all the chips melt. Then add other ingredients and finally the barium powder. Add the barium one teaspoonful at a time, mixing quickly and evenly until mixture is stiff and no more can be absorbed. Press into a greased 9 x 9 inch pan and chill. Cut and prescribe. (Total amount, approx. 2½ lb.)