SUSPENSION LARYNGOSCOPY IN CHILDREN.*

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Since the discovery of the laryngoscope by Garcia no more interesting chapter in the history of laryngology has been written than the most recent one by Killian^{1,2} in which he describes the discovery of suspension laryngoscopy. The original conception of a method by which a more definite, comprehensive and a closer view of the interior of the larynx might be obtained was an epoch-making thought and when after many trials on the cadaver extending over a period of two years, and many alterations in instruments he was finally rewarded with a picture of the larynx and surrounding parts, the like of which had never been obtained before, one can imagine his sense of pleasure. In addition to this, when the operator realized that the patient comfortably submitted to prolonged examinations, that he did not need the aid of assistants, and that both of his hands were free for any desired manipulation, his sensation must have been akin to exaltation.

Since Killian's original communication suspension laryngoscopy has been elaborated, its limitations and advantages having been carefully proved and commented upon. It has generally been conceded that in adults its limitations are greater than in children and in a personal communication from a former student now in Berlin, suspension does not seem to be used as much as it was. In children, however, all observers early recognized its value even before it had been tried out in many cases.

The difficulties attending the use of the laryngoscope in young children have often been so great that frequently no satisfactory examination could be obtained. These difficulties became increased when an attempt was made to perform any intra-laryngeal operation, so that in very young children, especially, it was practically impossible to perform any manipulation *per vias naturales*.

Direct laryngoscopy and tracheoscopy offered a solution to this difficult problem that was enthusiastically adopted by the profession. There are, however, many advantages in the suspension method over that of the ordinary direct endoscopy. By the latter method one obtains but a limited view while by suspension the entire field and surrounding parts are clearly before one. In operations both hands are free so that one may with ease perform an operation in

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this region, keeping the parts free from blood and secretion without difficulty. During suspension, the danger from asphyxia may be said to be *nil* while we all know that in the direct method, especially if the trachea is entered, this complication is one which must be reckoned with. Besides the advantages enumerated it is remarkable how clear a view may be obtained of the anterior commissure of the larynx and of the trachea. This statement applies particularly to children. In adults the most difficult region to bring into view has been the anterior commissure and although numerous modifications of Killian's original apparatus have been presented, it is believed that this difficulty represents an important limitation to the method.

The after-effects of the suspension method of examination are of no more serious moment than those of the most simply laryngeal manipulation, while in the ordinary direct method, annoying, not to say serious, swelling and edema have resulted in children.

The technic of this procedure in children differs but slightly from that in adults. It may be said to be somewhat easier, although in no event can this procedure be considered a difficult one. It is not necessary to draw the tongue forward, nor, in fact, to pay attention to the tongue. It is not necessary that the head hang far over the table; in fact, if a pillow be placed under the shoulders the head may even rest upon the table. In many instances, especially when examining or operating in the esophagus, the spatula need not be brought over the epiglottis, but resting well at the base of the tongue it will bring the parts into perfect view. Somewhat more difficulty has been encountered in tracheotomized cases than in non-tracheotomized ones. The secretions and blood flow by gravity away from the field of operation but sponging may be easily carried out and if necessary the parts may be kept clean by gentle suction, using a small electric suction pump.

The question of anesthesia in children is an important one. As a rule local anesthesia is not entirely satisfactory. The child's co-operation can not always be obtained even though one succeeds in anesthetizing the parts. Often, in order to obtain sufficient anesthesia to permit any extended investigation, cocaine must be used in considerable quantity which is conceded to be attended with decided danger in children. I have attempted a number of examinations in young children without any anesthesia whatever. In one instance, a baby about a year old was satisfactorily examined and a papilloma successfully removed from the larynx. It was afterwards shown, however, that other papillomatous growths had been

overlooked. On the whole, general anesthesia, preferably chloroform, has given me the best results. The Junker apparatus and tube add very much to the comfort and facility with which the anesthesia may be continued. Most of us will concede that chloroform is somewhat more dangerous than ether but the excessive secretion produced by the latter is a disadvantage, although not sufficiently great to condemn its use by those who are unalterably opposed to chloroform.

The specific uses to which suspension laryngoscopy has been applied have been numerous, despite the fact that it has been in use so short a time. It has been used (1) in the examination of cases for diagnosis; (2) for operations through the natural passages; (3) for the removal of foreign bodies.

In making an examination of the upper air passages the hypo-pharynx has frequently been overlooked. This method brings it into view better than any other means at our command. All portions of the larynx and some of the trachea are clearly seen, being brought closer to the observer's eye than by other methods. The field brought into view is not limited and the relations of surrounding parts are definitely established. The esophageal opening is easily outlined, enabling one to manipulate the upper part of this tube with ease. Operations in the pharynx, hypo-pharynx, larynx, trachea, upper part, and beginning of the esophagus may be carried out with ease and deliberation. Foreign bodies, especially impacted ones and those requiring some manipulation for their delivery, are more readily removed because of the advantage given by the free use of both hands. The following is a brief summary of the recorded uses to which suspension in children has been put:

Albrecht⁴ reports the following: Eight cases of papilloma in children from 4 to 9 years of age in all of which these growths were successfully and completely removed. Two cases of tuberculosis of the larynx of which the first was a child, 13 years of age. There was dyspnea due to infiltration of the ventricular bands with edema and granulations of the vocal bands. Relief was obtained by the removal of the infiltration and granulations. The second was a child, 9 years of age, with stridor from infiltrated ventricular bands with ulceration; relief by removal of the infiltration. Three tonsillectomies in children aged 4, 7 and 8 years, respectively.

Henrich⁵ reports the case of a child $3\frac{1}{2}$ years of age, with papillomata of both arytenoids, in the subglottic region, in the hypo-pharynx and in the esophageal entrance, successfully operated upon.

Davis⁶ speaks of the examination of an infant, 4 months old, suffering from laryngeal stridor. The cause was not determined.

In a child, 3 years of age, said to be suffering from laryngeal or tracheal obstruction, suspension was unsuccessful. Bronchoscopy succeeded but failed to reveal the cause of the dyspnea. Davis⁷ also removed a safety-pin from the larynx of a child, 11 months old, and a coin from a child, 4 years old, that had lodged in the esophagus.

Seifert⁸ reports the case of a child, 3 years of age, from whose esophagus a coin was delivered. A child, 2 years of age, suffering from papilloma was saved from tracheotomy by direct curettement. In a child, 5 years of age, he removed a bone from the larynx. Seifert recommends this method for the removal of vocal nodules in children, for the excision of a portion of tumors for histological examinations, for the removal of sub-glottic granulations and for the diagnosis of laryngeal diphtheria.

Freudenthal⁹ reports two most interesting cases of post-pharyngeal abscess in children, 16 and 19 months old, successfully operated upon. He also speaks of its uses in tonsillectomy, having performed this operation under suspension in twenty children.

Iglauer¹⁰ reports the case of a child, 3 years old, successfully operated upon for papillomata of the larynx; also that of a child, 5 years of age, from whose larynx he removed a broken safety-pin that had been there five months. Three cases of enucleation of the tonsils were undertaken by him. He states that he could see no special advantage in this procedure over the ordinary method.

I desire to report briefly the following cases. *Case 1.* W. L., aged 12. Moderate tuberculosis of the pharynx, extensive tuberculosis of the larynx with ulcerations and edema. This little patient suffered from slight dyspnea which gradually became worse until tracheotomy was necessary. Following the tracheotomy the patient's condition rapidly improved with ultimate healing of all ulcerations but marked cicatricial formation. This was before the days of suspension laryngoscopy. Four years after the tracheotomy, under suspension various attempts were made to remove the cicatricial tissue and dilate the stenosed larynx. The result was only partially successful and the patient is now being treated by gradual dilation with Schroetter's tubes.

Case 2: A. C., aged 2 years and seven months. At the age of 9 months the child drank some corrosive liquid, since which time she has been able to swallow only liquids. For the past nine days she has been able to take liquids only by spoonfuls. Parents suspect foreign body. X-ray examination with bismuth in ice-cream showed a small line in the upper extremity of the esophagus but it

was not recognized as indicating a foreign body. Bismuth was found in the stomach. Diagnosis, stricture. Under suspension the esophageal entrance was readily explored. Esophagoscope failed to enter. Small bougie after some manipulation passed into the stomach. Larger bougie, three millimeters in diameter, also successfully passed. Following the manipulation, the anesthesia having been discontinued, retching and vomiting took place, expelling a plum seed.

Case 3: This case occurred in the practice of Dr. Lockard of Denver through whose courtesy I am permitted to report it here. A girl, aged 26 months, drank strong solution of lye about six weeks prior to coming under observation. For forty-eight hours previous to the first examination she was unable to swallow anything. Under general anesthesia suspension laryngoscopy brought the mouth of the esophagus into plain view. It was impossible to introduce the smallest Jackson esophagoscope. A small probe followed by an olive bougie, three millimeters in diameter, was finally passed, locating the stricture at seven and eight inches, respectively, from the teeth. Four hours later she was able to swallow liquids. As it was impossible to pass an esophagoscope the suspension laryngoscope was an indispensable instrument, enabling one to find and safely pass the very small opening.

Case 4: M. C., aged 2½ years. Hoarseness for five months. On direct laryngoscopy under chloroform anesthesia, multiple papillomata were found springing from the vocal bands and from the base of the epiglottis. An attempt to remove these was made, resulting in sudden asphyxia which demanded immediate tracheotomy and artificial respiration. Three months later papillomata were removed under suspension by means of Corde's straight-cutting forceps or double curette. Five subsequent operations have been performed. At various times in spite of the tracheotomy tube alarming dyspnea has occurred. Suspension laryngoscopy revealed at these times sub-glottic and tracheal papillomata which were successfully removed. Recurrence has taken place from time to time and although the voice has been partially restored, the child still wears the tracheotomy tube.

Case 5: D. P., aged 8 months; hoarseness since age of 5 months. At birth child gagged and was blue for one-half hour. Has always cried but little. At present aphonia is nearly complete. Under suspension and general anesthesia multiple papillomata were removed from the anterior commissure. Voice restored. Four subsequent operations under general anesthesia and one with no anesthesia whatever have kept the larynx fairly free. Prior to the last

operation slight stridor in breathing was noticeable. Following this operation the voice returned, though husky in character, and the difficult breathing was completely relieved. Papillomata were found supra-glottic and infra-glottic.

I have been unable to find records of papillomata removed by suspension in a child of this age, although Jackson reports, in a personal communication, the case of an infant, 6 hours old, from whose larynx he removed a papilloma by direct laryngoscopy.

Case 6: A. G., aged 10 years. Hoarseness with a history of having inspired two days ago an immature wild oat or wheat head. Indirect laryngoscopy was readily carried out and revealed a green mass in the anterior commissure. Although the child was unusually tractable it was impossible to remove the foreign body by the laryngoscopic mirror and forceps. Under suspension and chloroform anesthesia, removal was accomplished with the greatest facility.

BIBLIOGRAPHY.

1. KILLIAN: *Berl. klin. Wchnschr.*, No. 13, 1912, p. 581.
2. *Arch. f. Laryngol. u. Rhinol.*, Bd. 26, 1912, p. 277.
3. R. STEINER: Suspension laryngoscopy. *Prag. med. Wchnschr.*, Vol. 38, 1913, p. 392.
4. W. ALBRECHT: The importance of suspension laryngoscopy in children. *Arch. f. Laryngol. u. Rhinol.*, Bd. 28, Heft 1, p. 1.
5. HENRICH: *Muench. med. Wchnschr.*, No. 48, 1913, p. 2666.
6. ED. D. DAVIS: Observations on suspension laryngoscopy with notes of a few cases. *Brit. Med. Jour.*, No. 2716, Jan. 18, 1913, p. 115.
7. DAVIS: Suspension for foreign body. *Jour. of Laryngol.*, April, 1914, p. 206.
8. A. SEIFFERT: Suspension laryngoscopy. *Semon's Intern. Contrbl. f. Laryngol.*, January, 1914, p. 5.
9. FREUDENTHAL: Suspension laryngoscopy with demonstration of method. *Ann. of Otol.*, June, 1913, p. 464.
10. S. IGLAUER: Foreign body in larynx and trachea removed by the aid of the suspension laryngoscope. *THE LARYNGOSCOPE*, June, 1913, p. 706. Suspension laryngoscopy. *THE LARYNGOSCOPE*, June, 1913, p. 683.
11. WALTER HOWARTH: Killian's apparatus for suspension laryngoscopy. *Jour. of Laryngol.*, October, 1913, p. 541.
12. W. ALBRECHT: A modification of suspension laryngoscopy. *Berl. klin. Wchnschr.*, July 8, 1912, Vol. 44, No. 28, p. 1331.
13. LOUIS G. KAEMPFER: Suspension laryngoscopy. *N. Y. Med. Jour.*, Vol. 97, No. 1, Jan. 4, 1913, p. 21.
14. WALTER HOWARTH: Killian's apparatus for suspension laryngoscopy. *Proc. Roy. Soc. of Med.*, April, 1913, p. 97.
15. W. FREUDENTHAL: Suspension laryngoscopy. *Arch. f. Laryngol.*, 1913, p. 459.
16. W. HOWARTH: Hock spatula for suspension laryngoscopy. *Lancet*, July 19, 1913, p. 155.
17. FREUDENTHAL: *Med. Rec.*, Feb. 22, 1913, p. 329.
18. KILLIAN: *Brit. Med. Jour.*, May 30, 1914, p. 1181.
19. LAUTENSCHLAGER: *Berl. klin. Wchnschr.*, No. 10, March 10, 1913, p. 448.
20. MANN: *Handbuch der speziellen Chirurgie des Ohres u. der oberen Luftwege*, p. 594.
21. E. MAYER: *Arch. f. Laryngol.*, Vol. 27, p. 588.

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