

SORE THROAT AFTER ANAESTHESIA

BY

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A sore throat is one of the more common sequelae of anaesthesia. Its relationship to endotracheal intubation and some of its more serious causes have been discussed by Wolfson (1958) who, in an analysis of 521 cases, found that the sex of the patient was the only factor affecting the incidence. By means of laryngoscopy at the end of anaesthesia Wylie (1950) noted the incidence of trauma produced by intubation.

This paper reports a study of the incidence of sore throat after anaesthesia and analyzes some of the factors which may have been responsible.

METHODS

All members of the Department co-operated in keeping punch-card records of all inpatients anaesthetized during the period from September 1958 to February 1959. On these cards were recorded the various details of the anaesthetic techniques employed. The techniques were those usually practised by the various anaesthetists taking part in the investigation; they were not influenced by the fact that an investigation was taking place. Some intubations were performed by students under supervision.

The details noted on the punch-cards included:

- The operation performed;
- Whether or not the patient was intubated;
- Whether or not a Ryle's tube was passed;
- Which, if any, muscle relaxant was used;
- The method of intubation;
- The type of laryngoscope;
- The type of endotracheal tube;
- The duration of intubation;
- Any local anaesthetic spray solution;
- The lubricant used on the tube;
- Whether or not a throat pack was used;
- Whether or not the intubation was considered difficult.

For three days after the anaesthetic each patient was visited in the ward by one of us (F.L.H.S.) who was not concerned with the actual administration of the anaesthetics and who recorded any symptoms on the same punch-card. A patient was considered to have a sore throat

if he complained of this either spontaneously or upon enquiry. Loss of voice, hoarseness and stridor were assessed objectively. No patient's throat was examined, and no attempt was made to investigate the pathology of a sore throat.

For the presentation and the analysis of results, sore throats were classified as "mild" or "severe". A mild sore throat was arbitrarily defined as one which lasted for one or two days only, unaccompanied by loss of voice or hoarseness or stridor. A severe sore throat was defined as one which was accompanied by loss of voice or hoarseness or stridor, or one which lasted for three days or more.

RESULTS

One thousand four hundred and eight patients were observed but before analyzing the results all patients having undergone pharyngeal or laryngeal operations or peroral endoscopies were excluded.* The remaining 1,259 patients included 475 males and 784 females, of whom 130 (27.5 per cent) and 178 (22.5 per cent) respectively complained of sore throats (table I). This difference is not statistically significant.

Six hundred and seventeen of the series were not intubated, whereas 642 had endotracheal tubes passed. Postanaesthetic sore throat was nearly four times as common in the intubated cases as in those which were not intubated (table II).

Patients not intubated.

Of these 617 cases, 63 (10.21 per cent) had postanaesthetic sore throat; 54 (8.75 per cent) were classified as mild, and 9 (1.46 per cent) were classified as severe (table III). The available data do not suggest a possible cause of sore throat

* Of these 149 patients, 132 complained of sore throats. There was nothing remarkable about the 17 without symptoms.

TABLE I
The sex incidence of postanaesthetic sore throat.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Male	345 (72.5%)	67 (14%)	63 (13.5%)	475	>0.05
Female	606 (77.5%)	122 (15.5%)	56 (7%)	784	
Totals	951	189	119	1259	

$$\chi^2=3.4824.$$

TABLE II
Postanaesthetic sore throat and endotracheal intubation.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Not intubated	554 (90%)	54 (9%)	9 (1%)	617	<0.01
Intubated	397 (62%)	135 (21%)	110 (17%)	642	

$$\chi^2=133.0144.$$

TABLE III
Postanaesthetic sore throat in patients not intubated.

Relaxant used	Symptom free	Mild sore throat	Severe sore throat	Total	P
Total	166 (92%)	12 (7%)	2 (1%)	180	>0.3
d-Tubocurarine	14 (100%)	0 (0%)	0 (0%)	14	>0.2
Gallamine	127 (92.5%)	8 (6%)	2 (1.5%)	137	>0.2
Suxamethonium	24 (83%)	5 (17%)	0 (0%)	29	>0.2
No relaxant	389 (89%)	41 (9.5%)	7 (1.5%)	437	>0.3
Total	554 (90%)	54 (9%)	9 (1%)	617	

In this and the following tables the P values refer to the difference between the figures to which they are appended and the figures for intubated or not-intubated cases shown in table II.

TABLE IV
Type of laryngoscope and method of intubation.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Magill laryngoscope	6 (60%)	1 (10%)	3 (30%)	10	>0.9
Macintosh laryngoscope	369 (61%)	133 (22%)	101 (17%)	603	>0.7
Blind intubation	15 (52%)	14 (48%)	0 (0%)	29	>0.2
Direct vision	380 (62%)	122 (20%)	111 (18%)	613	>0.7

TABLE V
Postanaesthetic sore throat and type of tube used.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Cuffed tube	331 (64%)	103 (20%)	87 (16%)	521	>0.5
Noncuffed tube	37 (50%)	28 (38%)	9 (12%)	74	=0.05
Latex tube	29 (62%)	4 (8%)	14 (30%)	47	>0.9

in this group. It is possible that it was due to a multiplicity of causes such as the use of airways, premedication with drugs that diminish secretions, the use of mildly irritating anaesthetic agents and the unduly prolonged withholding of postanaesthetic drinks. One hundred and eighty patients in this group (32.5 per cent) received muscle relaxants but there was no increase in the incidence of sore throat in these compared with the group as a whole. It is possibly a chance finding that of 14 patients who received d-tubocurarine none developed sore throat ($P > 0.2$).

Intubated patients.

Of the 642 patients who were intubated 245 (38.2 per cent) had sore throats, 135 (21.06 per cent) being mild and 110 (17.14 per cent) being severe (table II). With a few exceptions the incidence of sore throat was uniform among the intubated patients regardless of the techniques used or the agents employed. The exceptions and some of the cases conforming to this statement are worthy of further comment.

It was found that there was no greater incidence of sore throat following the use of a Magill laryngoscope than when a Macintosh laryngoscope was used (table IV). This is unlikely to be due to the small number of cases in which the

Magill laryngoscope was used. Further work has been planned to separate the effects of laryngoscopy alone from those due to the presence of an endotracheal tube or to another cause.

The high incidence of sore throat when non-cuffed tubes were used was an unexpected finding (table V). A possible explanation for this is that the inflated cuff anchors the tube in the trachea, so that movement of the tube relative to the trachea is unlikely to occur. Noncuffed tubes may move freely in the trachea, the larynx and the pharynx in response to movement of the patient's head or to respiratory movement.

Latex tubes, which were cuffed and armoured, were associated with the same incidence of sore throat as were ordinary rubber tubes.

Contrary to what might be assumed, no correlation could be found between the incidence of sore throat and the duration of intubation (table VI).

The insertion of a gauze pharyngeal pack moistened with water was associated with a high incidence of sore throat (table VII).

Red rubber Ryle's tubes which were swallowed in the ward by the patient before anaesthesia were associated with a high incidence of sore throat (table VIII).

TABLE VI
Postanaesthetic sore throat and duration of intubation.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Less than $\frac{1}{2}$ hour	61 (54%)	28 (25%)	23 (21%)	112	>0.1
$\frac{1}{2}$ to 1 hour	192 (65%)	61 (21%)	44 (14%)	297	>0.5
1 to 2 hours	113 (60%)	40 (22%)	32 (18%)	185	>0.8
Over 2 hours	31 (65%)	6 (13%)	11 (23%)	48	>0.7

TABLE VII
Postanaesthetic sore throat and throat packs.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Wet throat pack	22 (39%)	24 (42%)	11 (19%)	57	<0.001

TABLE VIII
Postanaesthetic sore throat and Ryle's tubes.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Ryle's tube	47 (46%)	27 (27%)	27 (27%)	101	<0.001

Spraying of the larynx with local analgesic solutions had no apparent effect on the incidence of sore throat (table IX).

throat, did show a significant difference from each other ($\chi^2=10.02$; $P<0.05$). A possible explanation for this is that the relaxation pro-

TABLE IX
Postanaesthetic sore throat and local analgesic sprays.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Total	93 (56%)	35 (21%)	37 (23%)	165	>0.2
Lignocaine 4%	92 (56%)	34 (21%)	37 (23%)	163	>0.1
Cocaine 10%	1 (50%)	1 (50%)	0 (0%)	2	>0.7

The use of local analgesic or other lubricants on the tube did not alter the incidence of sore throat except in the case of cinchocaine ointment, which was associated with a high incidence of sore throat (table X). This may be due partly to the greasy base of the preparation used, which might dissolve some irritant substance from the rubber of the endotracheal tube. The amethocaine ointment used had a similar base, but it was only used in six cases.

vided by gallamine, unlike suxamethonium, does not wear off rapidly and thus does not expose a lightly anaesthetized patient to the risk of "bucking" on an endotracheal tube. The increased incidence of sore throat after suxamethonium may be part of the muscle-pain syndrome so often seen after the use of this drug. Gallamine might be expected to provide slightly better intubating conditions than d-tubocurarine, as its onset of action is more rapid.

TABLE X
Postanaesthetic sore throat and lubricants used on tubes.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Lignocaine	271 (67.5%)	87 (21.5%)	44 (11%)	402	>0.05
K.Y. Jelly	128 (61%)	44 (21%)	38 (18%)	210	>0.8
Amethocaine	4 (67%)	2 (33%)	0 (0%)	6	>0.8
Cinchocaine	4 (27%)	6 (40%)	5 (33%)	15	<0.01
None	6 (67%)	3 (33%)	0 (0%)	9	>0.7

Of the muscle relaxants used, no statistically significant difference could be shown between the incidence of sore throat after suxamethonium and that after gallamine triethiodide or d-tubocurarine. There was, however, a trend toward a greater frequency of sore throat after suxamethonium and a lesser frequency after gallamine (table XI). Suxamethonium and gallamine, whilst not differing significantly from the mean incidence of sore

Among the commoner causes of difficulty of intubation are a bull neck, prominent incisor teeth, a stiff neck, and laryngeal and masseter spasm. These factors were not associated with an increased incidence of sore throat (table XII). However a miscellaneous group of 15 patients in which intubation was recorded as "difficult", due to causes other than those mentioned above, showed a higher incidence of sore throat than

TABLE XI
Postanaesthetic sore throat and muscle relaxants with intubation.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
d-Tubocurarine	42 (62%)	11 (16%)	15 (22%)	68	>0.8
Gallamine	130 (71%)	28 (15%)	26 (14%)	184	<0.05
Suxamethonium	133 (55%)	61 (25%)	46 (20%)	240	>0.05
Suxamethonium + another	89 (61%)	33 (23%)	23 (16%)	145	>0.9
No relaxant	3 (60%)	2 (40%)	0 (0%)	5	>0.9

TABLE XII
Postanaesthetic sore throat and difficult intubation.

	Symptom free	Mild sore throat	Severe sore throat	Total	P
Total	29 (51%)	14 (24.5%)	14 (24.5%)	57	>0.1
Bull neck	7 (50%)	2 (14%)	5 (36%)	14	>0.3
Prominent teeth	11 (69%)	3 (19%)	2 (12%)	16	>0.5
Stiff neck	1 (100%)	0 (0%)	0 (0%)	1	>0.3
Spasm	6 (55%)	3 (27%)	2 (18%)	11	>0.5
Other causes	4 (27.5%)	4 (27.5%)	7 (45%)	15	<0.01

other intubated patients; 11 cases complained (72.5 per cent). In this miscellaneous group the 4 symptom-free patients were all those in whom too large a tube was first chosen and then abandoned in favour of a smaller one. Of the 11 patients complaining of sore throat, 4 were difficult nasal intubations, 2 had displacement of the trachea due to thyroid disease, 1 was a difficult endobronchial intubation, 1 had a small larynx, 1 was found difficult by a student, and in 2 cases no reason was stated.

Among the factors not investigated which might have caused postanaesthetic sore throat was the skill of the anaesthetist, which does not lend itself to measurement. The influence of inhalation anaesthetics was not investigated because to state, for example, that a patient was given halothane might mean that he was fully anaesthetized for a haemorrhoidectomy or that he was given a small amount because of sweating during a gastrectomy, when the main agent used was nitrous oxide. Likewise the effect of oropharyngeal airways on the incidence of sore throat was not studied because all patients who would tolerate them were returned to the ward with airways in place. In some patients they were used throughout operation whereas in others the airway merely replaced an endotracheal tube at the end of it.

Again, it was hoped to investigate the influence of the size of endotracheal tube but the difficulty

of measuring the other variable, the size of larynx, made this pointless.

The method of sterilizing the endotracheal tube might influence the incidence of sore throat, but all tubes used were sterilized by boiling just after the end of the previous operation in which they were used.

SUMMARY

The incidence of postanaesthetic sore throat in 1,259 patients undergoing general anaesthesia was 308 (24.5 per cent).

In 617 patients who were not intubated the incidence of sore throat was 63 (10.2 per cent).

Of 642 patients who were intubated 245 (38.2 per cent) developed sore throat.

The influence of some of the factors that might have been responsible for this complication of anaesthesia is discussed.

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REFERENCES

- Wolfson, B. (1958). Minor laryngeal sequelae of endotracheal intubation. *Brit. J. Anaesth.*, **30**, 326.
 Wylie, W. D. (1950). *Anaesthesia*, **5**, 143.