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Colonization of helicobacter pylori in laryngeal pathologies among the patients in tertiary center

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Abstract:

Background: Helicobacter pylori can cause a chronic infection and is linked to the development of benign and malignant aerodigestive tract diseases. This study aims to observe the colonization of helicobacter pylori in laryngeal pathologies.

Method: A cross-sectional observational study was done among the cases undergoing surgery of the larynx at the Department of Otorhinolaryngology and Head and Neck Surgery in Bir Hospital, Nepal from 10 Aug 2020 to 15 Mar 2021. The specimen from the larynx was kept in a Rapid Urease Test dry test kit to observe the presence of H. pylori. The study was approved by the institutional review board. Data were analysed to find out the presence of H. Pylori in the samples, gastroesophageal reflux disease and colonization of Helicobacter, and benign vs malignant cases with Helicobacter. A p-value of <0.05 was considered statistically significant.

Result: Out of 30 participants, benign pathology was 11 and malignant 19. H. pylori colonization was found in 6(20%), 2 in benign (2/11, 18.2%), and 4 in malignant (4/19, 21.1%) cases. The difference in H. pylori colonization between benign and malignant cases was statistically insignificant, (p=0.62).

Conclusion: H. pylori colonization was found in 20% of larynx pathology, with no statistically difference among benign and malignant cases.

Keywords: Benign laryngeal disease, Helicobacter pylori, Malignant laryngeal disease, Rapid urease test

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Introduction

Larynx is an organ which is situated in the anterior neck at the level of C3-C6 and is divided anatomically into the supra-glottis, glottis and sub-glottis.[1,2] Vocal cord nodules and polyps are the two most common benign diseases.[3,4] Vocal abuse or misuse, smoking and recurrent respiratory tract infection are the most common etiological factors.[5] There are other benign conditions like ' 'Reinke's edema, arytenoid granuloma, vocal cord cyst, etc.[6,7] Squamous cell carcinoma is the most common laryngeal carcinoma. For diagnosis of a laryngeal lesion, direct laryngoscopy biopsy is done.

Helicobacter pylori is a microaerophilic, gram-negative spiral organism. Its presence in the stomachs of gastric ulcer patients was reported by rapid urease test (CLOtest) in 1989.[8] H. pylori bacterium has been identified in the upper aerodigestive tract.[9,10] Invasive and non-invasive diagnostics are available for determining the presence of H. pylori infection. The rapid urease test (RUT) is a rapid, cheap, and simple indirect test based on the presence of urease in tissue specimens that is frequently used in clinical practice.[11,12]

The recent 5-year studies have demonstrated that the bacterium can be an independent risk factor for the development of hypopharyngeal–laryngeal cancer.[13] Although scientists have been performing research on whether H. pylori may be an etiological factor for different laryngeal diseases, the data in this field are scanty. The purpose of this study is to identify H. pylori infection in benign and malignant laryngeal lesions among Nepalese patients in a Tertiary Hospital.

Method

This single-centered cross-sectional observational study was conducted in the Department of Otorhinolaryngology and Head and Neck Surgery (ORL & HNS) at Bir Hospital, Kathmandu, Nepal, from 10 Aug 2020 to 15 Mar 2021. The study was conducted after obtaining ethical clearance from the Institutional Review Board of the National Academy of Medical Sciences (Ref. no: 352/2077-78). Written consent was obtained from the patients.

Samples were taken by a simple convenient sampling method. The sample size was calculated to be 30, using the formula $N=z^2pq/e^2$, where z=1.28 at a 90 per cent confidence interval, p=prevalence of 24.5%,[14] q=1-p (75.5%), e=error (10%). In the study, 30 consecutive cases admitted to the ORL & HNS department of Bir Hospital, either for diagnostic or therapeutic procedures for lesions of the larynx, were recruited prospectively after taking written informed consent. Patients taking triple therapy within the last 2 weeks period before the surgery were excluded from the study.

Specimens from laryngeal lesions were screened for H. pylori infection by using a commercially available RUT kit manufactured by Gasto Cure System, Kolkata, India. The sensitivity and Specificity of the rapid urease test are 80-100% and 97-99%, respectively. The test sample, which was a 1-2 mm diameter piece taken from the laryngeal mass, was placed in an RUT kit for the detection of H. pylori. The result was considered to be positive if the color changed to orange or red and negative if the color remained yellow.

Data were analyzed using Statistical Package for Social Science (SPSS) version 25.0. Mean, Standard deviation, and range were used for socio-demographic characteristics. Fischer's exact test and Chi-square test were used to find out the association between gastroesophageal reflux disease (GERD) and H. pylori and the association between H. pylori and laryngeal lesions of benign or malignant disease.

Result

Out of 30 participants in this study, 11 underwent therapeutic procedures, and 19 underwent biopsies. The age ranged from 25 years to 79 years old, with a mean of 52.7±14.56 years, with males 19 and females 11, M: F 1.73:1, Table 1.

Out of 30 patients, 19(63.3%) had malignant laryngeal disease and 11(36.7%) had benign disease, Table 2.

Two out of 10 patients with GERD symptoms had H. pylori positive, and 8 had negative. Similarly, 4 out of 20 participants without GERD had positive H. pylori test, and 16 had negative results. The difference was statistically insignificant (p=0.694), Table 3.

Helicobacter pylori colonization in laryngeal biopsy material was found in 6(20%) participants out of a total 30 participants. Among 11 participants with benign laryngeal disease, 2(18.2%) participant's biopsy material showed H. pylori test kit positive, but 9(81.8%) tests were negative. Among the total 19 participants with malignant disease, 4(21.1%) had positive tests for H. pylori colonization in the larynx, but the majority, 15(78.9%), had negative results, statistically insignificant, p=0.62 (>0.05), Table 4.

Table 1. Age and gender distribution of patients with laryngeal pathologies, n=30

Variables	n	%
Age in years		
< 25	1	3.3
26-35	4	13.3
36-45	3	10.0
46-55	8	26.7
56-65	7	23.3
> 66	7	23.3
Mean±SD, 52.73±14.56		
Gender		
Male	19	63.3
Female	11	36.7

Table 2. Gender distribution of participants with benign and malignant laryngeal lesions, n=30

Variable	Benign	Malignant	n
Male	5	14	19
Female	6	5	11

Table 3. Association of GERD and colonization of Helicobacter pylori in larynx, n=30

H. Pylori	GERD present n(%)	GERD absent n(%)	p-value
Positive	2(20)	4(20)	0.694
Negative	8(80)	16(80)	

Fisher's exact test

Table 4. Association between H. Pylori and benign vs malignant laryngeal pathologies, n=30

H. Pylori	Benign, n(%)	Malignant, n(%)	p-value
Present	2(18.2)	4(21.1)	0.620
Absent	9(81.8)	15(78.9)	

Discussion

In this study, there were five males and six females with benign pathology of the larynx, whereas there were 14 males and five females with malignancy, male: female ratio was 7:1. Other studies have shown high prevalence in males, with a male to-female ratio of 15.6:1 and 3.2:1 in malignant and benign laryngeal disease respectively.[15] Another study also found a male-to-female ratio of 4.3:1 with SCC of the larynx.[16]

The present study has more malignant cases, which might be due to selection bias when more cases with suspected malignant conditions undergo biopsy within a short period of provisional diagnosis with a malignant: benign ratio of 1.72:1. In a study with a larger sample size of 81(51.9%) malignant cases and 75(48.1%) benign cases as a control had a similar result.[17] But in another study, only 13(16.7%) had laryngeal cancer and 65(83.3%) had various benign laryngeal diseases.[18]

Among 10 participants with a history of GERD, only 2(20%) showed positive H. pylori test. Similarly, out of 20 participants with no history of GERD, only 4 (20%) had a positive H. pylori test. The p-value was found to be 0.694 (p>0.05), which is insignificant. In a study done, 60% (18/30) of participants with reflux history had the presence of H. pylori, with no statistically significant difference between GERD status and H. pylori status.[19]

There are various invasive and non-invasive tests to diagnose the presence or absence of H. pylori. In this study, RUT was used to identify H. pylori in the larynx of participants. Rapid urease test was used as a diagnostic test because it is easily available, convenient to perform, and results can be observed instantly. Similarly, RUT was used in other studies.[14,18,20]

In the present study, the H. pylori RUT dry test was observed to be positive in a total of 6(20%) participants, out of which 5(83.3%) were male and 1(16.7%) were female. Similarly, 14(58.3%) participants who were male and 10(41.7%) females had a negative test for H. pylori. The p-value was found to be 0.256 (p>0.05), which was insignificant. Interestingly, in a study that included 24 males and six females, none of the participants were infected with H. pylori.[20] Yet, in another study, H. pylori was positive in laryngeal specimens in four males and two females out of a total of 35 participants.[21]

On the contrary, H. pylori was found in 34.6% of the cases, which is more than the result of the present study.[18] Yet, another study showed a 55.8% positive result with no statistically significant relation between the presence or absence of H. pylori and laryngeal lesions.[19] This difference in the incidence of H. pylori colonization in the larynx among the different studies might be due to the difference in several benign and malignant diseases enrolled in the study and also the use of different diagnostic tests in different studies.

Our study showed that 21.1% (4/19) of participants with malignant laryngeal disease had positive H. pylori tests. A study in which used a PCR test to confirm the H. pylori test and found the incidence of H. pylori to be 73.1% (19/26) with a p-value of 4.85 (p>0.05).[22] Other studies found the incidence of H. pylori in laryngeal malignant lesions (SCC) to be 80.9% (17/21)[23] and 90.3% (28/31)[24] respectively, which were very much higher than the results of our study. Other studies also report higher positive results of 62.5% (50/80).[25] On the other extreme, studies involving 50 cases[15] and 58 cases[26] with laryngeal cancer (SCC) respectively had 0% positive results and failed to find any evidence indicating H. pylori role in the pathogenesis of laryngeal cancer.

We found 18.2% (2/11) benign lesions had positive H. pylori results. Both positive results were seen in the vocal cord polyp case. Similar results were shown by a study which has a positive result in 17.14% (6/35) for H. pylori by RUT.[21] Similarly, a study reports 24.5% (13/53) of positive results by RUT, all seen in vocal cord polyps.[14] Contrary to the present study presence of H. pylori among participants, H. pylori-positive rate of vocal fold leukoplakia and vocal polyps was 23.5% (12/51) versus 11.4% (4/35), p=5.157).[27]

In our study, RUT for H. pylori were found positive in 6(20%) and negative in 24(80%) participants. When they were analyzed for the presence of malignant and benign lesions,

4(21.1%) out of 19 malignant had positive RUT dry test, whereas in the case of benign disease, 2(18.2%) showed positive test among 11 participants, the p-value was 0.62 (p>0.05) which is statistically insignificant. Contrary to this result, in a study H. pylori's positive rate was found to be 57% (8/14) of participants.[28] Similarly, a significantly higher presence of H. pylori in the larynx was seen in patients with laryngeal cancer than in benign laryngeal disease (71.6 vs. 25.3 %, p=0.001).[17] They utilized semi-nested polymerase chain reaction (SN-PCR) for H. pylori detection. However, other studies show no statistically significant differences between the two groups (benign 96.4% vs malignant 90.3%, p= 0.614) in context with the presence or absence of H. pylori.[24]

In the present study, the sample size was small, and we did not find the presence or absence of H. pylori to have any significant role in causing types of laryngeal disease, either malignant or benign. Further similar studies can be done in the larger sample size of laryngeal malignancy exclusively to study the prevalence of H. pylori.

Conclusion

This study indicates that Helicobacter pylori can colonize in the larynx of laryngeal pathologies, with a 21.1% (4/19) and 18.25% (2/11) of malignant and benign laryngeal disease showing positive RUT dry test respectively. We did not find a significant difference in the presence or absence of H. pylori in malignant or benign cases, which could be because of the small sample size.

Author contribution

Concept and Design: LBG, RP, TBP; Literature search: LBG, SG, DB, BG; Clinical studies and Experimental studies: LBG, RM, TDP; Data acquisition and compilation: LBG, SG, DB, BGDr; Statistical analysis and manuscript preparation: LBG, SG; Manuscript editing and review: RM, TBP; accountability: all.

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Conflict of interest

None

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Supplementary material

The data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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