THE EFFECT OF POSTURE ON ESOPHAGEAL pH IN ENDOSCOPY NORMAL REFLUX DISEASE (ENRD) CASES

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Abstract: Purpose of the study

Endoscopy Normal Reflux Disease (ENRD) is a common presentation of reflux disease. These patients are symptomatic but do not have abnormal endoscopy findings. They may have pathological intraesophageal reflux. Lifestyle modifications are the mainstay of management of these patients. Posture plays an important role in their management. It was felt that exact quantification of reflux pattern with different postures in ENRD cases should be studied to include it as a part of management of these cases.

Basic Procedures

Fifteen male patients were studied. 24 h ambulatory pH metry was done for all patients. Half an hour recording was studied for various postures: supine, supine with 30° head end elevated, upright, right and left lateral recumbent position. The data of pH metry for half an hour of each of these postures was studied.

Results and Interpretation

All fifteen patients were ENRD cases and were upright refluxers. None of them had an abnormal supine reflux pattern. The percentage time of reflux and the reflux episode duration was significantly low in supine (P<0.05) and supine with 30° head end elevated (P<0.005).

Conclusion

In our study of 15 upright refluxers, supine with 30° head end elevated and supine position were the postures associated with least reflux. Posture can help reduce the reflux significantly and can be used as an effective means in management.

Key words: ENRD gastroesophageal reflux disease posture 24 h ambulatory pH metry

INTRODUCTION

Gastroesophageal Reflux (GER) is not itself a disease, but a normal physiological process occurring in virtually everyone, multiple times everyday, especially after large meals, without producing either symptoms or signs of mucosal damage. In

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contrast, Gastro Esophageal Reflux Disease (GERD) is a gamut of disease usually producing symptoms, primarily heartburn (1).

The prevalence of GERD is increasing in Asia (2). With increasing age the prevalence of GERD complications are increasing, probably as a result of cumulative acid injury to the esophagus over time (3). GERD patients have abnormal reflux which may be with or without endoscopy findings. Endoscopy Normal Reflux Disease (ENRD) is a common presentation of reflux disease. These patients are symptomatic but do not have abnormal endoscopy findings. A subgroup of ENRD has intraesophageal pathological reflux and they are classified as non erosive acid reflux disease (4). These patients tend to be less drug compliant. Lifestyle modifications are the mainstay of management of these patients. Posture may play an important role in their management. Recent literature supports that the pathophysiology of ENRD and GERD with esophagitis is not comparable (5). Studies do quote the effect of various postures on reflux in GERD cases but in ENRD cases, it is not well studied.

Some postures are also known to relieve the symptoms of GERD patients (6). It is also known that symptom relief does not guarantee a normalization of intraesophageal acid reflux (7). Hence, it was important to study the effect of posture on reflux in ENRD cases and also to determine relief, if any, with a specific posture. For this purpose symptoms relief was not studied but the exact quantification of the reflux pattern in ENRD cases with different postures viz. supine, supine with 30° head end elevated, left lateral, right lateral and upright was planned to study the effect of different postures on lower esophageal pH in these cases.

METHODS

The present study was carried out at GI lab, department of physiology from 2007-2009.

Inclusion criterion

The study was carried out on 15 ENRD patients in the age group of 39±7 years. Patients with symptoms of GERD after a thorough systemic examination and gastrointestinal endoscopy were routinely referred to our lab for 24 hours ambulatory pH metry. During the 24 hour period of study the patients were instructed to adopt five postures and record the time of the postures. Only patients who were endoscopically negative and who showed findings of 24 hr ambulatory pH metry suggestive of pathological esophageal reflux were included. History of alcohol intake and smoking formed the exclusion criteria. Also patients on drugs like α blockers, β blockers, anticholinergics, morphine, dopamine, barbiturates and theophylline were excluded from the study as these drugs are known to reduce tone of lower esophageal sphincter (LES) (1).

Institutional Ethical Committee clearance was obtained and patients were included after counseling them about the nature of the study and informed consent was taken.

Ambulatory pH metry

24 hour pH monitoring was found to be
The diagnosis of ENRD is made if a patient with symptoms suggestive of GERD is found to be endoscopically negative but on 24-hour ambulatory pH metry is found to have features of GERD, i.e., has DeMeester score of 14.7 and more or percent total time pH <4 of 4.2% and more or percent total upright time pH <4 of 6.3% and more or percent total recumbent time pH <4 of 1.2% and more (9-11). In these diagnosed ENRD patients the posture data was taken and the reflux patterns studied. Each reflux episode was defined as a drop in pH to 4 or lesser. Various postures were studied for percentage of time pH <4, number of reflux episodes >30 seconds and single longest episode (minutes).

The pH metry data was analysed using WinReflux software.

Analysis

The data was analysed using Non-Parametric Kruskal Wallis test with post hoc tests (SPSS package version 12.0, Chicago).
normal subject is shifted from left lateral recumbent to upright, through pressure is maintained but in GERD, upright incompetence is more than normal (13) and hence a reflux is seen. In 1994, it was suggested that upright refluxers are probably early GERD cases (6). GERD was considered a spectrum from upright reflux to supine/bipositional reflux and then proceeding to esophagitis and other complications of GERD. In 2002, it was suggested that erosive and non erosive reflux disease cases do not interchange groups i.e. it is less likely for ENRD cases to show erosive changes (14) and this may be due to different pathogenesis (5). So ENRD patients are distinct entity and upright refluxers of ENRD are different from supine refluxers.

Studies have been done to differentiate between ENRD and erosive GERD patients. 220 GERD patients were studied using pH metry and endoscopy by Frazzoni et al in 2003. They divided the patients into erosive GERD, ENRD and complicated GERD. Total percentage acid reflux time was significantly lower in ENRD as compared to the other two groups. The difference in their study was found to be significantly lower supine nocturnal percentage acid reflux time in these ENRD cases (15). Supine reflux is also associated with higher incidence of esophagitis and positive endoscopy findings as compared to upright reflux (16). So, it is likely that more upright refluxers were seen in the present study of ENRD cases, as they are less likely to develop esophagitis and abnormal endoscopy findings.

The difference in pathogenesis will be helpful in understanding the posture effects in these two different categories. Erosive as compared to ENRD is associated with lower

RESULTS

Fifteen patients (all males) completed the study. They were non smokers and denied history of alcohol consumption. The duration of symptoms of all fifteen patients was not more than four months with a mean of 70.13±26.28 days. All were found to be upright refluxers i.e. in the 24 hour record, they had upright percentage time pH<4 more than 6.3%. They were not supine or bipositional refluxer i.e the percent time pH<4 in supine posture was not pathologically increased to 1.2% and more. The effect of various postures on the patients is depicted in Table I.

<table>
<thead>
<tr>
<th></th>
<th>Supine</th>
<th>Supine</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upright head elevated</td>
<td>6.98</td>
<td>1.96**</td>
<td>2.54*</td>
<td>11.23</td>
</tr>
<tr>
<td>Averaged percentage of time pH&lt;4</td>
<td>0.91</td>
<td>0.27**</td>
<td>0.34*</td>
<td>1.0</td>
</tr>
<tr>
<td>Averaged number of episodes ≥30 seconds</td>
<td>0.93</td>
<td>0.15**</td>
<td>0.2**</td>
<td>1.46</td>
</tr>
</tbody>
</table>

Using post hoc tests *P<0.05 and **P<0.005.

DISCUSSION

ENRD patients in our study were all found to be upright reflux disease patients. None of them was supine or a bipositional reflux disease patient. In a study conducted in 2010, it was found that a mild weakening of Gastroesophageal valve occurs when a
mean distal esophageal amplitude of contraction in esophagus (15) which is likely to be due to motility problem which is also a cause for esophagitis (17) as impaired peristalsis delays the acid clearance in the esophagus and hence longer acid exposure (18) and increased chance of developing esophagitis.

Crural sphincter pressure dynamics are also different in upright and supine refluxers. In 2001, eighty upright refluxers and eighty two supine refluxers were studied. Supine refluxers had higher crural pressure which acts as a mechanical ring and as a physiological protector against unfolding of LES in postprandial and upright periods but higher crura sphincter pressure gradients caused subsequent reflux in supine position (19). Upright refluxers have higher reflux during upright posture and postprandial period.

In the present study, postprandial reflux data was avoided as, a time gap of at least three hours between food and posture time for analysis was taken. In the present study all fifteen upright refluxers had higher upright reflux. Fujiwara et al demonstrated in a case-controlled study a relationship between shorter dinner-to-bedtime and an increased odds ratio for reflux. This finding was observed when the dinner-to-bedtime was less than 3 h (20).

In the present study it was found that supine and supine with head end elevated were associated with significantly lowest reflux in all the parameters. Most of the studies done on endoscopically positive cases recommended that left lateral recumbent (21) and supine with head end elevated (1, 22) posture may be associated with less reflux whereas supine and right lateral were not considered helpful (22). The supine posture is conventionally thought to be more conducive to reflux because of the opposing effect of gravitational forces on reflux in the upright position (22) and further complicated if there is aperistalsis too. Upright refluxers tend to have shorter LES length but comparable mean LESP as compared to supine refluxers (23) and the main mechanism leading to reflux during the day in upright position are increased Transient Lower Esophageal Sphincter Relaxations (TLESRs) with normal resting LES pressure (24). Also, the frequency of TLESRs is higher in the vertical than in the supine position (25, 26). Postural suppression of TLESRs and gas reflux with supine posture is generally preserved in ENRD (27).

The mechanism of postural suppression of TLESRs remains unclear. It was observed that posture shows changes in the frequency of TLESRs in dogs (28) but the exact mechanism is not known. It was postulated that frequency may be diminished by denervation of fundus of the stomach (29). It was proposed that the fluid bathing the gastric cardia triggers inhibitory reflexes (30) but that was refuted by subsequent studies (31). Another theory propounded was that transient sphincter relaxation results from excitation of mechanoreceptors located in the proximal stomach (28). Since the air accumulates in the fundus of the stomach in the vertical position, it is likely to stimulate these mechanoreceptors. On the other hand, ingested air is likely to be more uniformly distributed in the stomach in the supine position, therefore causing less excitation of the mechanoreceptors located in the fundus of the stomach (31).
Considering this, recumbent position in left or right lateral should also benefit but in the present study, both left lateral and right lateral position did not show any significant improvement. Radiographs done in left and right recumbent position show different physio dynamics of air and acid. In a study done by Katz et al, barium radiographs were taken in different positions. In the right recumbent posture, they reported that EG junction was submerged in a barium pool below the air-barium interface in the stomach. In contrast, this occurred in 0/23 patients in the left recumbent and 1/23 patients in the upright postures because the EG junction was in the air above the barium pool. They concluded that posture influences reflux frequency and composition, and the latter is likely due to whether the EG junction is submerged below liquid gastric contents or in the air above the liquid gastric contents (32).

Average duration of longest episode (min) showed that the episodes were significantly the shortest in supine and supine with head end elevated. However none of the episodes was more than 2 minutes duration in all the subjects in all the postures. Studies show that longer durations are associated with increased incidence of esophagitis and shorter duration with intact peristalsis may be a safety mechanism by which our patients did not have abnormal endoscopy findings.

In conclusion, position does affect reflux duration but the effect of posture also depends on the absence of esophagitis and the type of reflux pattern i.e upright, supine reflux or bipositional reflux. It is therefore highlighted that ambulatory 24 h pH metry is essential to determine type of refuxers apart from endoscopy workup. It is also important to note that supine position with head end elevated and supine position both were useful in reducing the reflux significantly in our study of ENRD cases with upright refuxers. Lateral position was associated with higher reflux.

Confounding factors like smoking, h/o alcohol intake, h/o drugs, etc as mentioned in our exclusion criteria play an important role in affecting the data obtained and therefore a very strict exclusion criteria was followed. The number of patients though less but were a sample with none of these known confounding factors. Study is a pilot project and more number of cases over a period of time may give us further insight into the management of ENRD using posture therapy.

REFERENCES

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