Abstract

Objectives: Aim of the study was to access the rate of deflation of two commonly used inflatable balloons in management of epistaxis at human body temperature.

Design: In-vitro experimental study.

Setting: Microbiology department in District general hospital.

Methods: Twenty randomly selected Foley’s and Brighton balloon catheters each, were inflated with 10 mls of air or water and kept at 37 degree centigrade in culture room of the Microbiology department.

Main outcome measures: The rate of deflation at human body temperature in both balloons inflated with air and water at 24 hours & 48 hours in terms of pressure, volume and diameter were accessed.

Results: Foley’s catheter deflated completely within first 24 hours. The rate of deflation in Foley’s inflated with water was faster when compared to same group of Brighton balloon (paired t-test P<0.05). The pressure in these balloons was much higher than capillary pressure of lining mucosa of post-nasal space.

Conclusion: If the pressure in post-nasal balloons has to be maintained for more than 24 hours, it is better to use saline/water for inflation. Brighton balloons maintain both pressure and volume for much longer period than Foley’s at human body temperature.

Introduction

Epistaxis is one of the most common Otolaryngological emergencies. Haile had used inflatable balloons to control bleeding as early as 1849. The first inflatable rubber nasal pack was used successfully by Beck¹. Mawson used first inflatable postnasal tampon and Johnson used Foley catheters to control post-adenoectomy bleeding in 1956. Since then various balloons were used with some modification in design and material. Currently there are numerous balloons available in the market licensed to use in management of epistaxis. However, Foley’s catheter is still not licensed to use but remains commonly used balloon catheter² and despite manufacturer’s recommendation to use either saline or water to inflate, air is still being used to inflate by some³. Inflamed, air is unsuitable for inflation of catheters unless specified in manufacturer’s instructions⁴.

There are few studies in the past assessing the rate of deflation in different post-nasal space balloons, but none of them measured the actual pressure in the balloon which is more important in both arresting bleeding and reducing complications if any, secondary to persistent high pressure.

Methods and Materials

The most commonly used inflatable balloons (Foley’s and Brighton) were selected for the study. Forty balloons catheter 20 Foley’s and 20 Brighton were randomly selected from the stock (Fig 1 & 2). All forty balloons were checked for any leak before inflation either with water or air, then the initial pressure, diameters were measured. Accuossy sphygmomanometer was used to measure pressure, which is used in segsten oesophageal balloons (Fig 2 E). All 40 balloons were inflated with 10 ml of either water or air and all three variables were measured. Twenty from each type of balloon catheters were divided into two groups, one group of balloon catheters was inflated with 10mls of water and other with 10 mls of air. Five balloons catheter inflated with air and five with water from each type were labeled as 24 hours study group and other 10 as 48 hours group. All forty balloons were kept in a culture chamber at Microbiology department in the hospital where temperature is maintained at 37 degree centigrade. This simulates normal human body temperature and observations were made for rates of deflation in a controled environment. The rate of deflation in terms of volume, diameter and pressure of balloon catheter were measured at 24 hours and 48 hours, as post-nasal balloon catheters are usually taken out after 24 hours or 48 hours of insertion. Data were analyzed using SPSS 10 software for rates of deflation for all three variables at 24 hours and 48 hours, as post-nasal balloon catheters are usually taken out after 24 hours or 48 hours of insertion. The level of significance was defined as P<0.05.

Results

Foley’s catheter inflated with air deflated completely within first 24 hours. The rate of deflation with water in Foley’s catheter was slower compared to air but much faster when compared with Brighton balloon (Table 1 & 2, Fig. 3 & 4). As Foley’s catheter with air deflated completely within first 24 hours when compared to Foley’s catheter with water, its obvious that it was clinical significant.

When the rate of deflation in Brighton balloon were compared with air and water it was statistically significant (P value < 0.05) for all three variables (volume, diameter & pressure). Comparing Foley’s and Brighton balloons inflated with water for the rate of deflation, was much slower in Brighton than Foley’s and it was statistically significant at 24 hours and 48 hours readings (P-value < 0.05).

Conclusions

Inflatable balloons are still widely used in management of epistaxis, still there are so many unanswered questions with regards to its exact action in haemostasis in post-nasal space. Our study showed the pressure in post-nasal inflatable balloons is very high and rate of deflation is more rapid with air and Foley’s catheter than water and Brighton balloons. As there is no strict guidelines with regards to how long the balloon should be left in post-nasal space, if one needs to maintain pressure over blood vessels in nasal and post-nasal space, it’s better to use water than air and Brighton balloon than Foley’s catheter.

References