Seasonality in the incidence of abdominal aortic aneurysm ruptures: a review of eight years

Abdominal aort anevrizma rüptürlerinin mevsimsel dağılımı: Sekiz yılın retrospektif analizi

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BACKGROUND

Ruptured abdominal aortic aneurysm (RAAA) is a highly mortal entity. In recent years, the role of seasonality has been proposed in the incidence of RAAA. In this study, we sought possible correlations between monthly atmospheric pressures and the number of patients admitted with RAAA.

METHODS

Twenty-four patients who were admitted to our Trauma and Emergency Surgery Department with a diagnosis of RAAA from January 1995 to May 2003 were retrospectively evaluated. Data were collected from patient records, admission charts, hospital death certificate registry, and operating-room records. Only patients whose diagnosis of RAAA was confirmed during surgery were included. Atmospheric pressure records of İstanbul for individual months covering the study period were obtained from the Meteorology Office. The incidences of RAAA and the mean monthly atmospheric pressures were compared.

RESULTS

Most of the patients were admitted in winter months. Admissions culminated in January with six patients, at which time the mean atmospheric pressure was 765.5 mmHg. There were no admissions in May, during which the mean atmospheric pressure was 760.8 mmHg. The distribution of monthly admissions for RAAA was not statistically significant ($p>0.05$). The mean atmospheric pressures tended to run a higher course before the months in which increased admissions were seen.

CONCLUSION

Our findings do not corroborate the presence of a relationship between the incidence of RAAA and the atmospheric pressure.

Key Words: Aortic aneurysm, abdominal; aortic rupture; atmospheric pressure; risk factors; seasons.

AMAÇ

Abdominal aortik anevrizma yırtığı (AAOY) yüksek oranda ölümcül bir durumdur. Son yıllarda, AAOY görülme sıklığında mevsimselliğin de rolü olduğu ileri sürülmüştür. Bu çalışmada, aylık atmosfer basıncı değişiklikleri ile AAOY ile başvuran hasta sayısı arasında olası ilişkiler araştırıldı.

GEREÇ VE YÖNTEM

Ocak 1995-Mayıs 2003 tarihleri arasında Travma ve Acil Cerrahi Kliniği'ne AAOY tanısıyla yatırılan 24 hasta retrospektif olarak değerlendirildi. Çalışma verileri, hasta kayıtları, yatış belgeleri, hastane ölüm tutanakları ve ameliyat kayıtlarından derlendi. Çalışmaya yanlızca ameliyat sırasında AAOY tanısı doğrulanan hastalar alındı. Araştırma kapsamına giren aylara ait atmosfer basınç değişikliklerinin dağılımını gösteren kayıtlar İstanbul Meteoroloji Müdürlüğü'nden sağlanarak, aylık ortalama atmosfer basınçları ile AAOY ile başvuran hasta sayısı arasında ilişki olup olmadığı incelendi.

BULGULAR

Kış aylarında başvuran hastalar çoğunluğu oluşturmaktaydı. En çok başvuru (6 hasta), ortalama atmosfer basıncının 765.5 mmHg ölçüldüğü ocak ayında yapıldı. Yatan hastanın olmadığı mayıs ayında ortalama atmosfer basıncı 760.8 mmHg idi. Aylara göre hasta dağılımı ile atmosfer basınçları arasında anlamlı ilişki bulunmadı ($p>0.05$). Ortalama atmosfer basıncının yüksek seyrettiği aylardan sonra hasta başvurularında da artış görüldü.

SONUÇ

Verilerimiz, AAOY sıklığı ile atmosfer basıncı arasında anlamlı ilişki olduğunu doğrulamadı.

Anahtar Sözcükler: Aortik anevrizma, abdominal; aort yırtığı; atmosfer basıncı; risk faktörü; mevsim.

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The existence of seasonal variations in the incidence of many diseases such as influenza or peptic ulcer perforation is well-established and it is used as a helpful clue in the differential diagnosis. Mortality from myocardial infarction or a cerebrovascular accident has been shown to have a seasonal occurrence; thus, several authors have focused on the seasonal variation in the incidence of ruptured abdominal aortic aneurysms (RAAA).[1,2] Many studies have reported higher incidences during the season; however, the exact calendar months, during which the highest incidence in RAAA is reported varies. Variability in the tendency to rupture may result from meteorological differences between diverse seasons and changes in atmospheric pressure.[2-5]

In this study, we aimed to seek for correlations between atmospheric pressure and the incidence of RAAA to evaluate the hypothesis of seasonality.

MATERIALS AND METHODS

All patients who were admitted to the Trauma and Emergency Surgery Department of Istanbul Medical Faculty from January 1995 to May 2003 with a diagnosis of RAAA were retrospectively evaluated. Data were collected from patient records, admission charts, hospital death certificate registry, and operating-room records. Only patients whose diagnosis of RAAA was confirmed during surgery were included.

Atmospheric pressure records on the city were obtained from the Meteorology Office of İstanbul (Kandilli Meteorological Observatory, İstanbul) for individual months covering the study period. The mean sea-level atmospheric pressures were calculated from daily readings and the mean atmospheric pressure change for each month was compared to that of the previous one. Finally, the incidences of RAAA and the mean monthly atmospheric pressures were compared and distributions of values were illustrated on a monthly basis (Table 1). Fischer's exact test was used for statistical analysis.

RESULTS

During the eight-year period, 24 patients were admitted and underwent surgery for RAAA. Most of the cases were admitted in winter months. Admissions culminated in January, at which time the mean atmospheric pressure was 765.5 mmHg. The lowest number of admissions were recorded in May, during which the mean atmospheric pressure was 760.8 mmHg. However, the distribution of monthly admissions for RAAA was not statistically significant ($p>0.05$). The number of patients admitted in a certain month seemed to correlate with the mean atmospheric pressure recorded for that month, but this did not reach significance. Interestingly enough, the mean atmospheric pressures tended to run a higher course before the months in which increased RAAA admissions were seen.

DISCUSSION

In our study, we aimed to validate the hypothesis of seasonality in aortic aneurysm ruptures and to find correlations between the atmospheric pressure and the incidence of RAAA. An aneurysmal rupture and expansion in diameter or volume can be more precisely predicted by means of a combination of factors rather than relying on a single factor. The actual cause of an aneurysm rupture occurring at a particular point in time is unknown.

Changes in blood pressure have often been implicated in the occurrence of ruptures,[3] although low FEV_1 and smoking were also found to be a risk factor in the U.K. Small Aneurysm Trial.[6] In another study, a longitudinal aneurysmal expansion, cross-sectional area, tobacco use, tortuosity, and diastolic blood pressure were found to be associated with aneurysmal rupture and expansion.[7] Minami et al.[3] and Brennan et al.[1] documented seasonal changes in blood pressure, but no relationship was reported between atmospheric pressure and blood pressure. In a study by Bown et al.[2] the number of patients admitted with RAAA in a particular month was in a statistically significant correlation with the mean atmospheric pressure for the

Table 1. Monthly distributions of patient admissions and mean atmospheric pressures

Months	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
No. of patients	6	2	3	3	0	3	1	1	0	3	1	1
Pressure (mmHg)	765.5	764.4	762.3	759.9	760.8	758.6	759.5	759.5	760.6	764	764	764.2

previous month. They found that each month with a low mean atmospheric pressure was followed by one with a high rate of patient admission. Contrary to this finding, we found that the highest incidence of RAAA occurred in January and this was preceded by one of the highest mean atmospheric pressures (764.2 mmHg) recorded in December. Moreover, the highest atmospheric pressures measured in January, February, March, October, November, and December were in parallel to an increased number of admissions seen in the following months, which amounted to a total of 16 cases. Similarly, the lowest atmospheric pressures were measured in June, July, and August (758.6 mmHg, 759.5 mmHg, and 759.5 mmHg, respectively); the number of patients admitted totalled only two in July and August.

Two other studies reported no relationship between atmospheric pressure and the incidence of ruptures.[4,5] Sterpetti et al.[4] who reviewed autopsies performed over a 30-year period and found 77 ruptured aneurysms reported that the incidence had coincided with significant changes in the atmospheric temperature. Upshur et al.[5] reported no evident seasonality related to the monthly incidence of ruptured aortic aneurysms.

In conclusion, our findings do not corroborate the presence of a significant relationship between the incidence of RAAA and the atmospheric pressure. Despite the small size of patients reviewed, our data showed that the number of RAAA cases increased in winter months. Further prospective studies with larger series may shed more light on this association.

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