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Original Article

The Influence of seasonality on testicular torsion incidence from 2010 to 2019 in Paulista east region

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Abstract

The emergency medical condition that characterizes the spermatic cord torsion engenders the need to learn more about the pathophysiology of this condition. Since studies have shown seasonality and temperature as potential influencing factors in increasing the incidence of testicular torsion, this study aims at corroborating with this information, which is still controversial in the medical literature, however of great importance for the understanding of this disease. The objective is to know both the incidence and prevalence of testicular torsion in the Paulista east region, as well as whether the climate conditions establish seasonality with its incidence and prevalence. Regarding methodology, we accessed the DATASUS platform to collect information about the Paulista east region cases from 2010 to 2019. Moreover, a request for access to maximum and minimum temperature data for all months from 2010 to 2019, in the studied area was made to INPE. The graphs and the statistical analysis were performed by means of Excel Microsoft 365® and IBM SPSS®, respectively. The result of comparing all the studied information has shown that low temperature is a potential factor to increase the number of spermatic cord torsion, however the statistical analysis finds that it is not possible to establish a seasonality pattern in this condition.

Introduction

Testicular Torsion is an acute emergency picture, clinically characterized for scrotal volume increase, hardening, edema and pain in infant or adolescent [1]. The internal and external fascia divide the scrotum into two independent compartments, which contain the testicle, epididymis, spermatic cord, and cremaster muscle [2]. The sudden rotation of the spermatic cord on its central axis compromises the sanguineous flow to the testicle, allowing for ischemia occurrence and, many times, infarct [2,3]. Due to complications severity associated with treatment delay, such as orchiectomy and decreased fertility, immediate evaluation and management are required [4].

Epidemiological data show an unusual condition in general population, which affects 1 in 4,000 male individuals under 25 years of age and is responsible for up to 25% of acute scrotal disease in pediatrics [5]. This disease can occur in any range of age, however it is more common in the adolescent population [6].

Although the pathophysiology of the now rotated sperm cord has been well studied, the exact mechanism that leads to this outcome has not been well understood. Low ambient temperature is a candidate risk factor, since the torsion can be precipitated by unchained cremasteric reflex activity due to exposition to cold. This potential risk factor related to ambient temperature allows us to infer that there is a correlation between seasons and testicular torsion occurrence, thus this disease can have seasonal nature. This fact has already been described in medical literature, even though it has been contested by some authors [7].

Although it is not a condition of high prevalence, the gravity of spermatic torsion outcome emphasizes the necessity of immediate therapeutics and diagnosis, which denotes great importance of an in-depth study of its risk factors.

Classically, patients complain of severe scrotal pain that can occur at rest, with physical effort, or after trauma. Nausea and vomit can be present in 10 to 60% of the cases. Similar previous and self-limited episodes may compose the history of the current disease in children, featuring torsion with spontaneous resolution [8].

At scrotal inspection, it is important to show size discrepancy in hemi-pouch, edema, presence or absence and location of erythema, skin thickening and position of the testicles [4]. There may be unusual testicular positioning, with the elevation of the organ, apart from absence of cremasteric reflex. The manual elevation of the testicle without pain relief can also indicate torsion [8]. Ultrasonographic findings with colored Doppler in spermatic

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cord torsion include reduction or absence of intratesticular flow and parenchymal heterogeneity in comparison to the contralateral testicle, however it is operator-dependent and passive of imperfections [1,8].

According to literature references, testicular torsion is a surgical emergency because testicular viability is inversely related to the duration of torsion, and orchiectomy after surgical distorsion occurs in 30% to 70% of patients [8]. As soon as the diagnosis is made, surgical treatment must be considered. Manual maneuvers can be carried out to re-position the testicle, in order to undo the torsion with immediate pain relief, however, many authors state that surgical procedure is essential due to the possibility of persistent partial torsion. The goal is to revert the torsion and reestablish the blood flow to the testicle. Contralateral orchiectomy is recommended and can be done through the same incision, for new torsions prevention. If the testicle is impracticable, orchidectomy and prosthesis implant should be performed during the same act [9,10].

Objective

General

To know the incidence and prevalence of Spermatic Cord Torsion in Cone Leste Paulista;.

Specific

To evaluate if climatic seasons establish seasonality in incidence and prevalence of testicular torsion;

Methodology

Data used in this work are available online and are provided by the computer science department of the Sistema Único de Saúde (DATA-SUS), of public domain. On the website, it was first accessed the health information area (TABNET), followed by the area of health assistance, where it was selected hospital production (Sistema de Informações Hospitalares - SIH/SUS) and Consolidated Data (Hospital Internment Authorization - AIH) by place of residence from 2008 onwards. In the line of hospital procedures, city was the selected variable; in the content, the variable after approved AIH was selected and in the column, the non-active option was chosen. In "periods", each month of each year between 2010 and 2019 was selected separately, including these two. And the cities selected separately were Cachoeira Paulista, Queluz, Lorena, Cruzeiro, Roseira, Aparecida, Pindamonhangaba, Taubaté, Tremembé, Caçapava, Potim, Jambeiro, Monteiro Lobato, São José dos Campos, Santa Branca, Jacareí, Silveiras, Lavrinhas, Areias, Santa Isabel, Guaratinguetá. The testicle/spermatic cord torsion surgical treatment was the chosen procedure.

The second part of the data collection consisted of making a request to the Instituto Nacional de Pesquisa (INPE) of referring data and maximum and minimum temperatures of the same cities used for the collection of numbers of cases of testicle/spermatic cord torsion surgical treatment procedure and during the same used period. The averages among maximum and minimum temperatures of each month and the average of quarterly average temperature in each year have been calculated. After collection of all data, Excel Microsoft 365© was used for the production of graphs of the quarterly average temperature of each year separately from the 10-year long period (Graph 1), variation of average temperature in the first, second, third and fourth trimesters in the studied period of 10 (Graph 2), number of spermatic torsion cases in each trimester of each year (Graph 3), variation of the number of spermatic cord torsion cases in the first ones, seconds, thirds and fourths trimesters in the studied period of 10 (Graph 4), and of the variation of temperature related to the variation of number of spermatic cord torsion cases in each trimester of each year separately (Graph 5) and of the variation of

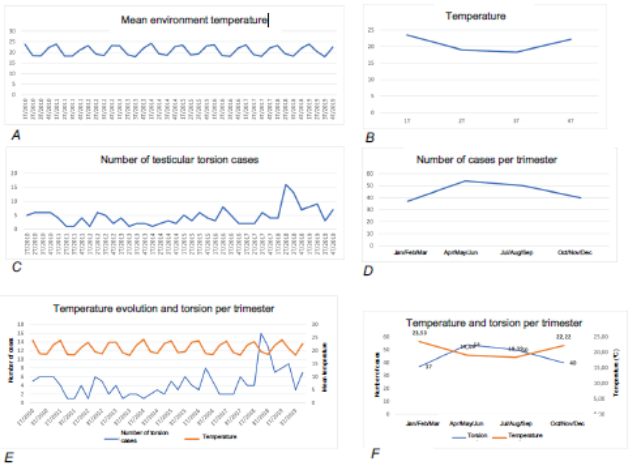

Figure 1. Charts and Graphs

Table 1. Descriptive statistics

	N	Min	Max	Med	SD
Jan/Feb/Mar	10	1	8	3.8	2.20101
April/May/Jun	10	1	16	5.5	4.64878
Jul/Aug/Sept	10	1	13	5.1	3.54181
Oct/Nov/Dec	10	2	7	4.0	2.05480

Table 2. Hypothisis test

Null Hypothesis	Test	Significance
Distribution is equal along the year	Independent data test of Kruskal-Wallis	.392

Table 3. Hypothesis summarize test

Decision
Retain the null hypothesis

Significance level: .050
Asymptotic significance is displayed

number of cases of torsion related to the temperature in the trimesters (Graph 6). For construction of statistical analysis tables, the IBM SPSS® program was used and applied the test of descriptive for calculation of the minimum, maximum, average analysis, error, deviation (Table 1) values and applied the non-parametric Kruskal-Walli test for averages of the number of cases in each trimester comparison (Tables 2 and 3).

Results

The average temperature of the first trimester (January, February and March), of the 10-year period (2010 to 2019) of the regions collected, was 23.72°C, of the second trimester (April, May, June), 19.34°C, of the third trimester (July, August, September) 18.60°C and of the fourth trimester (October, November, December) 22.37°C, as observed in graph 1. Therefore, the lowest temperature averages correspond to the third trimester, followed by the second. In opposition, the highest averages had been referring to the first and the fourth trimester, which had the highest average temperature, as shown in graph 2.

The total number of spermatic cord torsions, identified from 2010 to 2019, was 186. From this amount, we can observe in graph 3, that 38 cases (20.43%) occurred during the first trimesters (January, February and March), 56 cases (30.10%) occurred during the second trimesters (April, May and June), 52 cases (27.95%) were reported during the third trimesters (July, August and September), and 40 cases (21.50%) during the fourth trimesters (October, November and December) from 2010 to 2019.

The results showed that - during the trimesters of lower average temperature - higher number of cases occurred (Graph 4). When comparing the trimester with smaller number of cases to the trimester with higher number of cases, a temperature difference of 4.38°C is seen. However, it was evidenced that during the second trimester 4 more cases occurred, even though the temperature average was higher than 0.74 °C.

The graphs produced from the collected data showed the existence of a relationship between temperature reduction and spermatic cord torsion cases increase in the region of Vale do Paraíba (except - mountain and coastal region) during the period of 10 years (2010 the 2019), what is shown in graphs 5 and 6.

However, the statistical analysis performed by the test of independent samples of Kruskal-Wallis did not stress the existence of seasonality in spermatic cord torsion incidence. When comparing the averages of case numbers in each trimester, a significant level of 0.050 was obtained "the distribution of number of cases is equal for each categories of trimester" null hypothesis (Table 2), along with the decision that the null hypothesis must be retained (Table 3).

Discussion

In the present study, we identified spermatic cord torsion incidence increase during the second and third trimester in the last ten years in Cone Leste Paulista. This finding is in accordance with medical literature, including the work of author Shukla RB, in which he suggests that cold weather can cause contraction of the cremaster muscle and / or the tunica dartos and cause this condition [11].

The research, however, has some limitations. The data collection made in the DATA-SUS platform allowed us to acces only the cases where patients had been submitted to surgical procedure for spermatic cord torsion correction and did not include in our data those patients who were lately diagnosed or mistakenly diagnosed with orchiepididymitis and thus had not been submitted to surgical treatment. Therefore, the incidence of spermatic cord torsion cases in this study may be underestimated.

Moreover, the public system of health data contemplates only the population that uses the public health service, excluding those that use the private health system. However, the incidence of our study is not significantly altered due to the fact that only 32,7% of the population of Cone Leste Paulista having access to health insurance in the year of 2019, according to data of National Agency of heath.

Another bias to be considered is that only the average temperatures of a determined month during the study period were considered, and not the exact temperatures at the time each twist occurred.

Even though results were adverse, the methodology used prioritized the strategic choice of a region with cities that did not possess much different climatic factors, which could influence the study results, to the detriment of the inclusion of a great sample of cities [12,13]. The data from mountain and coastal regions of Vale do Paraíba have not been used, due to climatic differences caused by altitude, sea and mountains influences that could make the study biased. Moreover, we covered a great number of cities in a long period of time (10 years) and obtained a considerable number of registered cases.

Thus, it became possible to find reliable results, as shown in graphs 5 and 6 of temperature and number of occurring cases. It is worth noting that although results of the statistical analysis used did not reinforce the hypothesis of seasonality influence in the incidence of cases, relationships between variation in temperature and number of cases corroborate with information in literature regarding the role of low temperature in occurrence spermatic cord torsion.

Korkes et al, 2012 had studied 21,289 patients in the state of São Paulo-Brazil, using public data of DATA-SUS, relating them to climatic conditions, concluded for the predisposing effect of low temperatures and seasonality in spermatic cord torsion [12]

Gomes et al, 2013 in carried retrospective study in General Hospital, had concluded that there was an increase of spermatic cord torsion cases during the months whose average temperature was lower [13].

In the present study, the geographic area studied was smaller to reduce possible influence of local characteristics on the results, despite the conclusions being similar.

It is important to consider that the results obtained may not correspond to all cases in the studied region, as it is known that a considerable portion of patients with spermatic cord torsion may not have been diagnosed and, therefore, may not be accessible in public data.

Conclusion

In the studied population, a pattern favorable to increase in incidence in cases of spermatic cord torsion in the Cone Leste Paulista region (Vale do Paraíba) was identified during the trimesters with lower ambient temperature, even though the existence of a clear seasonality pattern in the studied period has not been confirmed.

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