post-arrival evaluation in girls adopted from China, Palacios et al.[3] found significant catch-up growth in every anthropometric parameter. In the longitudinal analysis of the height z score, we found catch-up growth through age 8 years, with a decrease between ages 8 and 10 years and stabilization from 10 to 16 years. In the longitudinal analysis of the BMI z score, compared to linear growth, we found a greater catch-up growth through age 6 years, similar growth between ages 6 and 10 years, and progressive growth between ages 10 and 16 years.

The mean age at thelarche was 10 years and 1 month (SD, 1 year and 3 months). At this follow-up visit, the mean weight was 30.3 kg (SD, 4.6), the mean height 137.1 cm (SD, 5.8; *z*, −0.40; 32.9th PCTL), the mean BMI 16.1 (SD, 1.7; *z*, −0.30; 38.3th PCTL) and the mean percentage body fat 16.1% (SD, 1.9%). The mean age at menarche was 12 years and 2 months (SD, 1 year). At this visit, the mean weight was 38.7 kg (SD, 3.7), the mean height 149.5 cm (SD, 5.8 cm; *z*, −0.44; 32.9th PCTL), the mean BMI 17.3 (SD, 1.2; *z*, −0.38; 35.1th PCTL) and the percentage body fat 18.1% (SD, 1.3%). Hayes and Tan,[5] in a survey of the adoptive parents of a cohort of 814 girls adopted from China into North America, found a mean age at menarche of 12.37 years (95% CI, 11.84–13 years). In the group of adopted girls analysed in our study, we found a mean linear growth of 20.2 cm from the beginning of Tanner stage II to the time the adult height was achieved; the peak height velocity between thelarche and menarche was 12.4 cm, and the mean remaining linear growth after menarche was 7.8 cm. These data suggest that pubertal development in these girls could be considered normal.[6] However, the height achieved by age 16 years and 4 months, compared to Chinese linear growth charts and the WHO child growth standards, was smaller by 2.85 cm and 5.4 cm, respectively.[7]

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https://doi.org/10.1016/j.anpede.2023.03.014
2341-2879/

Modified Valsalva manoeuvre in paroxysmal supraventricular tachycardia: Case series

Maniobra de Valsalva modificada en taquicardia paroxística supraventricular: serie de casos

Dear Editor,

Paroxysmal supraventricular tachycardia (PSVT) is the most frequent form of sustained tachycardia in childhood. It is defined as tachycardia caused by a rhythm disorder originating above the His bundle.

Its most frequent electrocardiographic presentation is regular tachycardia with a narrow QRS complex. The heart rate is usually greater than 180–220 beats per minute (bpm) in infants, and at least 120–150 bpm in older children. It responds to vagal manoeuvres and drugs that slow conduction through the atrioventricular node. Clinically, it is well tolerated, but when it is prolonged, patients may develop signs of congestive heart failure.[1]

The main goal of acute treatment is to stop the arrhythmia, slow down the ventricular response and restoring the sinus rhythm. In stable patients, the initial management should consist of vagal manoeuvres, as they can succeed in ending the tachycardia in cases involving the atrioventricular node in the conduction pathway. In school-aged children and adolescents, this is mainly achieved through the Valsalva manoeuvre, as both ocular pressure and carotid sinus massage are not recommended in these age groups.[2] In paediatric patients, the effectiveness of vagal manoeuvres ranges between 30% and 60%.[3,4]

One of the ways to increase the vagal parasympathetic tone is to increase venous return. Studies in adults have investigated different modifications of the traditional Valsalva manoeuvre technique to increase vagal tone. In particular, the study conducted by Appelboam et al.[5] found a statistically significant increase in the effectiveness of

DOI of refers to article: https://doi.org/10.1016/j.anpedi.2023.04.007

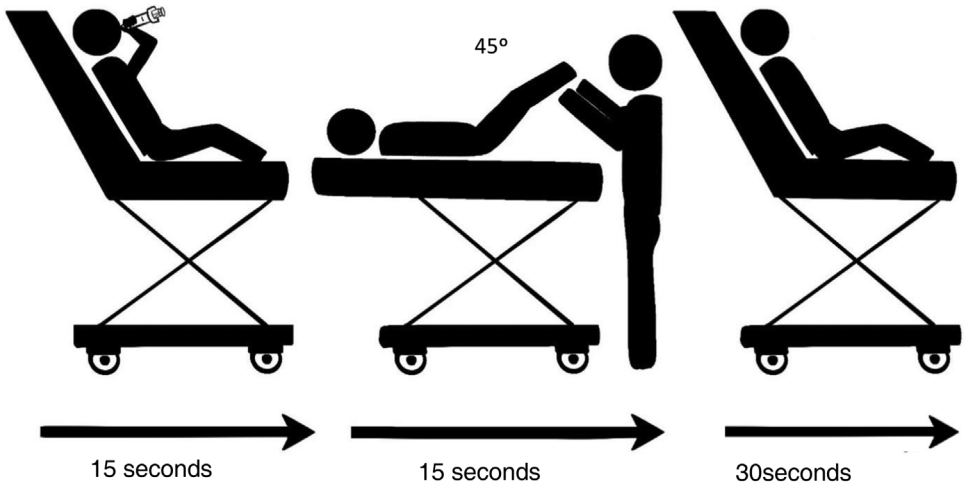

Figure 1 Modified Valsalva manoeuvre.

Table 1 Characteristics and outcomes of patients with PSVT who underwent the modified Valsalva manoeuvre.

Age (years)	Sex	Previous episodes	Treatment of previous episodes	Current treatment	Time elapsed from onset (minutes)	Heart rate (bpm)	Number of attempts of Valsalva manoeuvre	Administered antiarrhythmic drugs
9	Female	Yes	Spontaneous resolution	No	15	260	2	Not needed
12	Female	No	–	No	180	183	1	Not needed
7	Male	Yes	Traditional Valsalva	No	120	212	2	Adenosine
10	Female	Yes	Adenosine	Clorazepate dipotassium	20	240	3	Not needed
6	Female	Yes	Adenosine	Atenolol	60	180	1	Not needed
10	Male	Yes	Spontaneous resolution	No	20	200	1	Not needed
13	Female	Yes	Traditional Valsalva	No	60	190	1	Not needed
9	Male	Yes	Adenosine	Atenolol	60	221	3	Adenosine

nonpharmacological measures with the performance of the so-called modified Valsalva manoeuvre, increasing the cardioversion success rate by a factor of 2.5, with a 28% reduction in adenosine administration. In the paediatric population, there is the additional advantage that patients tend to respond better to vagal manoeuvres (30%–60% of children compared to 17% of adults).

To date, no studies have been published analysing the effectiveness of this manoeuvre in the paediatric population.

We conducted a multicentre prospective study with data collection between February 2019 and January 2021. Before its initiation, the study received the approval of the competent ethics committee. The sample consisted of cooperative children aged 6 or more years with a diagnosis of PSVT who were haemodynamically stable. After explaining the procedure and obtaining the signed informed consent, the patient underwent the modified Valsalva manoeuvre, as shown in Fig. 1: starting with the patient standing, the patient exhales forcefully into a 10 mm syringe against the resistance of the plunger for 15 s. Then, the patient is placed in the supine position with the lower extremities elevated for 15 s, and finally stands again for 30 s.

We collected data for the 8 patients with PSVT treated with the modified Valsalva manoeuvre. Three were male and 5 female, and their median age was 9.5 years. All but one had had previous episodes. Of these 7, 3 had needed adenosine to control the tachycardia, and 2 patients received daily treatment with atenolol.

In 6 of the 8 patients (75%) the modified Valsalva manoeuvre was effective, in 4 in the first attempt (50%). The modified manoeuvre succeeded in restoring the sinus rhythm in 2 out of the 3 patients who had needed adenosine in the past.

As for the 2 patients who ultimately needed adenosine, one received antiarrhythmic treatment at home, and in the other, the manoeuvre had initially achieved cardioversion, but the tachycardia recurred in a few minutes.

All patients remained stable and had favourable outcomes, and none experienced adverse events following the performance of the manoeuvres.

Table 1 summarises the characteristics of the sample.

In adults, there is evidence that the modified Valsalva manoeuvre is safer and more effective in reverting PSVT. In addition, this is a modification of the traditional manoeuvres that is simple and non-invasive. In our experience, the performance of this modified manoeuvre in haemodynamically stable cooperative paediatric patients achieved very satisfactory outcomes in terms of safety and successful cardioversion, although the sample was small. Further studies are required to establish firm indications for the use of the modified Valsalva manoeuvre in the paediatric age group.

Funding

The study did not receive any specific financial support from agencies in the public, private or non-for-profit sectors.

Acknowledgments

Red de Investigación de la Sociedad Española de Urgencias de Pediatría (RISeuP-SPERG).

Noa Ramos Gómez (illustrator).

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https://doi.org/10.1016/j.anpede.2023.04.013
2341-2879/