(nebulization drugs, for example), the cost of blood analysis after discharge (at most 2 per patient) or other indirect costs such as loss of productivity, amongst others.

Several elastomeric infusion pumps are available for this kind of treatment. The Easypump® works independently of gravity or electricity. It can be stored at room temperature or refrigerated for several days, according to the drug to be administered.

Despite the fact that not all antibiotics can be administered through HIAT due to their stability characteristics, it has many advantages: it improves quality of life of patients, decreases absenteeism (work and school), admission days and the risk of nosocomial infections and provides cost savings, while maintaining equal treatment effectiveness.[2,4–6]

Although only a few patients have been enrolled so far, our preliminary experience with HIAT was very positive, with the CF patients achieving an improvement of their lung function, and only one patient not being able to complete treatment. However, not all patients are good candidates for this kind of treatment, so for HIAT to be successful it is necessary to carefully select patients and provide a well prepared multidisciplinary team for HIAT. An appropriate study to determinate the real cost differences is also needed.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Pulmonary aspergillomas management: A 26-years case series of surgical therapy

Dear Editor,

Among the clinical syndromes caused by the fungus *Aspergillus* spp., aspergillomas are the most common form of pulmonary involvement. This non-invasive form of aspergillosis consists of a fungus ball – formed by fungal hyphae, inflammatory cells and tissue debris – and usually develops in pre-existing lung cavities.[1,2] Although aspergillomas resolve spontaneously in up to 10% of the patients, they tend to remain stable in most cases.[1,2] They can present with haemoptysis or, less commonly, cough, dyspnoea and/or fever. However, there is no consensus on the best treatment approach: whereas medical management has yielded limited results, surgical removal seems to be the only long-term efficient treatment but is overshadowed by a relatively high rate of post-operative complications.[1,2]

This study consisted of a 26-years (January 1990–December 2015) retrospective assessment of pulmonary aspergilloma surgical interventions in a single centre in the north of Portugal (Centro Hospitalar de Vila Nova de Gaia/Espinho). A previous clinical series, encompassing 60 cases that occurred between 1990 and 2004, has been published.[3] We updated and extended that series, focusing on surgery-related morbidity, mortality, follow-up and clinical relapses.

During the period considered, 88 patients were submitted to pulmonary aspergilloma surgical intervention: 72.7% of them were male, their average age was 46.5 years, and almost half of them (46.6%) were or had been smokers (Table 1). Tuberculosis was the most common underlying lung pathology, being present in 73.6% of the patients, whereas bronchiectasis and chronic obstructive pulmonary disease (COPD) were present in 19.0% and 13.6%, respectively. Seven patients (8.0%) had been diagnosed with diabetes and two patients suffered from chronic kidney disease. Aspergillomas were equally distributed by side (51.1% in the right lung and 48.9% in the left lung), and

Table 1 Cohort characterization.

Demographic variables	
Male sex (*n*/%)	64 (72.7%)
Age (average ± SD)	46.5 ± 12.1
Smokers and ex-smokers (*n*/%)	41 (46.6%)
Cigarettes' pack-years (average ± SD)	43 ± 23
Previous lung pathologies	
Tuberculosis (*n*/%)	64 (73.6%)
Bronchiectasis (*n*/%)	16 (19.0%)
COPD (*n*/%)	12 (13.8%)
Other clinical conditions	
Diabetes (*n*/%)	7 (8.0%)
Chronic kidney disease (*n*/%)	2 (2.3%)
Symptomatology	
Haemoptysis (*n*/%)	74 (84.1%)
Chronic cough (*n*/%)	58 (68.2%)
Bronchorrhea (*n*/%)	12 (14%)
Aspergilloma morphology	
Simple (*n*/%)	36 (40.9%)
Complex (*n*/%)	52 (59.1%)
Surgical procedure	
Lobectomy (*n*/%)	66 (75.0%)
Pneumonectomy (*n*/%)	10 (11.4%)
Wedge resection/segmentectomy (*n*/%)	9 (10.2%)
Bilobectomy (*n*/%)	3 (3.4%)

more commonly located in the upper lobes (78.0%). In respect to symptomatology, the majority of the patients presented haemoptysis (84.1% of all patients), whereas 68.2% and 14% presented with chronic cough and bronchorrhea, respectively (Table 1). Most patients (56.8%) had normal respiratory function.

All surgeries were done under general anaesthesia and patients were intubated with a double-lumen endotracheal tube to allow selective lung ventilation. A posterolateral thoracotomy approach was employed, and the type of resection was selected in each case in order to minimize the resected tissue without compromising the disease elimination: a lobectomy was performed in most patients (75.0%), whereas a pneumonectomy, a wedge resection or a segmentectomy and a bilobectomy were performed in 11.4%, 10.2% and 3.4% of all patients, respectively (Table 1). The majority (59.1%) of the aspergillomas had a complex morphology, according to the definition of Belcher and Plummer.[4] Six patients (6.8%) required a subsequent surgical intervention because of wound dehiscence ($n = 2$), haemothorax ($n = 1$), broncopleural fistula ($n = 2$) and empyema ($n = 1$).

Patients' chest tubes were removed in median five days (interquartile range 7–17) after surgery, while patients' discharge took place in median 11 days (interquartile range 4–11) after the intervention. Four patients (4.5%) died within 30 days of surgery, and 38 (43.1%) presented some type of post-surgical complication (Table 2). An air leak for a period more than 5 days was the most common complication, affecting 31.8% of the patients. Moreover,

Table 2 Post-operative morbidity and mortality.

	n (%)
Mortality (within 30 days of surgery)	4 (4.5%)
Prolonged air leak (>5 days)	28 (31.8%)
Empyema	9 (10.2%)
Nosocomial pneumoniae	7 (7.9%)
Haemoptysis	3 (5.0%)
Wound dehiscence	3 (3.4%)

10.2% patients presented with empyema, 7.9% developed a nosocomial pneumoniae, and 5.0% maintained haemoptysis. Patient follow-up lasted for nine months on average (±17) and the overall global mortality was 7%. Two patients had a contralateral relapse.

The incidence of post-operative morbidity increased more than 2.5-fold (16.3% in the 1990–2004 period to 42.9% in the 2005–2016 period). This may be related with the higher frequency of aspergillomas with a complex morphology: in fact, 64.0% of all aspergillomas between 2005 and 2016 were considered to be complex versus 56.7% between 1990 and 2004. A complex morphology is indeed a poor prognosis factor for aspergilloma surgical removal.[5]

There was a slight reduction in the mortality rate (5.0% in the 1990–2004 period and 3.6% in the 2005–2016 period). The post-operative mortality of aspergilloma patients is considered to be relatively high, with some series reporting up to 44%.[5] However, contemporaneous series tend to present lower values, similar to the one reported here.

Overall, the clinical characteristics, symptomatology and outcomes of this case series, the largest one described in Portugal, overlap those previously published in the literature, and support an early surgical intervention as the most effective option for aspergilloma patients. In fact, taking into account that more than half of the patients with an aspergilloma will eventually develop haemoptysis, and up to 20% will have a fatal haemorrhage, the risks of surgery are largely justified.[5] Moreover, aspergilloma surgical removal attenuates or eliminates the symptomatology, increasing patients' quality of life and life expectation.

Authors' contribution

Ana Luísa Vieira drafted the manuscript, Susana Laeiro and Pedro Fernandes supported data collection, Miguel Guerra conceived and designed the study and all authors revised the manuscript and approved its final version.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Current state and evolution of the tobacco epidemic in Portuguese and European school-aged adolescents by sex, between the years 1998 and 2014

To prevent tobacco consumption among adolescents, Portugal and other countries have implemented policies such as the development of curriculum-based programmes, environmental changes (e.g., smoke-free schools; bans on smoking in public places); parental involvement and restrictive strategies for tobacco access (e.g., restriction of tobacco purchase age, creation of specific places for selling).[1] However, despite the global progress in tobacco control, more than one third of the world's population is still unprotected from the level recommended by the MPOWER approach adopted by WHO.[1]

Monitoring the tobacco epidemic is necessary to evaluate the effectiveness of the preventive measures developed to control tobacco consumption by adolescents and adults. This study aimed to characterize the current state and evolution of tobacco epidemic in Portuguese school-aged adolescents and to compare it with other European countries, by sex, based on data from the Health Behaviour in School-Aged Children (HBSC) reports from 1997/1998[2] (the date on which Portugal became integrated into this report) to 2013/2014, the latest study.[6] These reports are based on data collected by self-report questionnaires applied to adolescents aged 11, 13 and 15 years old, from 19 European countries.[2–6] For this study, daily and weekly smoking was grouped as regular smoking (including those who smoke ''at least one cigarette per week''). According to the most recent HBSC report,[6] the prevalence of regular smokers aged 15 years old in Portugal is 12% among boys and 10% among girls, which is similar to the European mean prevalence (12% among boys and 11% among girls).

Regarding the evolution of tobacco consumption in Portugal, between 1997/1998 and 2013/2014,[2–6] the prevalence of regular smoking among adolescents aged 15 years old has decreased from 19% to 12% in boys and from 14% to 10% in girls; at 13 years old, the smoking prevalence has decreased from 5% in boys and 4% in girls to 3% for both sexes; at 11 years old a decrease was also observed from 2% in boys and girls to 1% in boys and 0% in girls (Fig. 1).

Concerning the evolution of regular smoking prevalence in the 19 European Union countries from 1997/1998 to 2013/2014,[2–6] oscillations occurred over time in both males (Fig. 2a)) and females (Fig. 2b)). Among male adolescents, a decrease in the prevalence of regular smokers was observed in the majority of the European countries between the 1997/1998 and 2009/2010 (Fig. 2a)). Between 2009/2010 and 2013/2014, a decrease in the smoking prevalence was registered in all countries with the exception of Portugal, which registered an increase of 1 percentage point in relation to the previous four years. According to data from the HBSC reports between 1997/1998 and 2013/2014, the prevalence of female smoking adolescents (Fig. 2b)) in Europe has been decreasing in a general and accentuated way, especially in the last four years.

In the majority of the countries that participated in the HBSC study, gender differences in prevalence were found; for example Hungary, France, Slovakia, Czech Republic, Germany, Denmark and Sweden present higher prevalence among girls. The rise in consumption among girls, particularly in Central and Eastern Europe, is a cause for concern and specific aspects related to female smoking should be reflected in preventive measures, such as the risk of thromboembolic complications when consumption occurs simultaneously with hormonal contraceptives.

Like Portugal, the majority of the European countries have opted for partial smoking bans in public places, however some countries have gone further, opting for complete bans in enclosed public places, public transport and workplaces, and these factors can help to explain the differences in prevalence registered among the countries in the HBSC study. Those countries with a lower prevalence of regular smoking among adolescents (Norway and Sweden) have