BIOLOGIJA. 2011. Vol. 57. No. 3. P. 111–114

Reversibility of bronchiectasis in Kartagener's syndrome: patient's right to high quality health care services

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Kartagener's syndrome is a rare autosomal recessive genetic disease with progressive damage of the respiratory system and situs inversus. Although the management of patients with Kartagener's syndrome remains uncertain and evidence is limited, it is important to follow up these patients with an adequate and shared care system. This report presents a clinical case of Kartagener's syndrome in a 25-year-old woman. Computed tomography showed dextrocardia and bronchiectasis. After 7 years, good treatment results were achieved: radiological findings and lung function were improved. The present case demonstrates the complex interrelationship among genetic variation and a proper nonspecific management of Kartagener's syndrome.

Key words: bronchiectasis, reversibility, Kartagener's syndrome

INTRODUCTION

Kartagener's syndrome is an autosomal recessive disorder primarily manifesting as ciliary movement disorder [1]. Kartagener's syndrome is a part of the larger group of disorders referred to as primary ciliary dyskinesia (PCD). Although the condition is usually inherited in an autosomal recessive pattern, and some specific gene defects have been recognized, it is clear that the syndrome shows substantial genetic heterogeneity [2]. The incidence of this genetic disorder is estimated to be between 1 and 2 per 30 000 births [3]. Symptoms result from defective cilia motility in the airways [2, 3]. The recurrent pulmonary infections are caused by the grossly impaired mucociliary transport in the respiratory tract causing stasis of the mucus within the bronchi [1, 4]. Progressive and significant lung damage occurs up to the time of diagnosis [3, 4]. The following three diseases of the lower airways have been described in older children and adults with primary ciliary dyskinesia: pneumonia, bronchiectasis, and asthma [5]. Although the management of patients with Kartagener's syndrome remains uncertain, it is important to control chronic lung infections and deterioration in lung function. Efforts to identify interactions between genetic factors and environmental determinants may lead to improved understanding of the pathogenesis of the bronchiectasis.

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CASE REPORT

This report presents a clinical case of Kartagener's syndrome in a 25-year-old woman. The patient complained of cough and sputum. Examination of the respiratory system revealed coarse crepitations with scattered rhonchi all over the chest. Apex beat was on the right side of the chest in the right lateral position. The liver was palpable on the left hypochondrium. Computed tomography (CT) of the chest showed dextrocardia and bilateral bronchiectasis (Fig. 1). Spirometry showed mild obstruction: FEV_1, 93% pred. (3.27 L); FVC, 110% (4.40 L); FEV_1/VC, 74%. We analyzed other genetic markers which are important for lung protection: main antiproteasis-alpha-1 antitrypsin (AAT) and secretory immunoglobulin A (IgA). Patient's *AAT* genotype was wild type (PiMM) and AAT concentration was higher limit of normal range K– 2 g/l. Immunoprotective IgA level was also high – 3.5 g/l.

The past medical history was notable for repeat chest infections, chronic sinusitis, and chronic otitis from early

childhood. At the age of 14, Kartagener's syndrome was diagnosed. The diagnosis was based on clinical and radiological picture. Screening of the patient's family genealogy identified no other cases of Kartagener's syndrome (Fig. 2). At diagnosis, spirometry showed first-degree bronchial obstruction: FEV1, 88% pred. (3.08 L); FVC, 111% (4.45 L); FEV1/VC, 69%. Starting at the age of 18, the patient was followed up by adult pulmonologists and geneticists. Computed tomography of the chest (Fig. 3) revealed dextrocardia, pulmonary fibrosis, and multiple bronchiectasis of the upper lobes. In microbiological assessment the most common pathogens isolated were Haemophilus influenzae, Pseudomonas aeruginosa and Serratia marcescens.

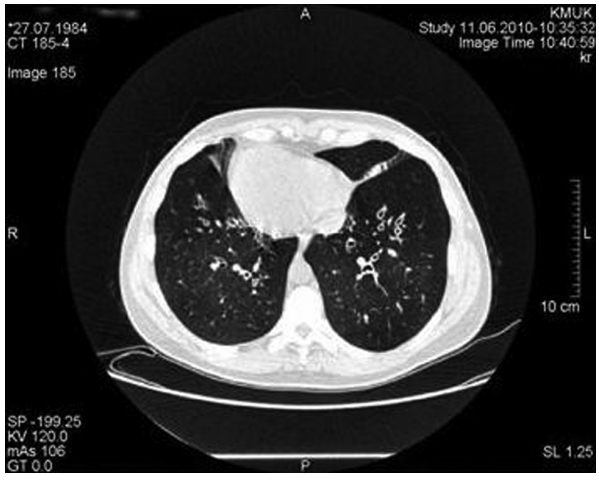

Fig. 1. Chest computed tomography at the age of 25

Long-acting inhaled bronchodilators (β2-agonists, salmeterol at a dose of 50 μg per day) were administered for treatment of bronchial obstruction. Treatment of severe or persistent exacerbations of bronchiectasis with short 10–14-day courses of antibiotics and mucolytics (oral bromhexine at a dose of 16 mg 3 times per day) was effective. The mean annual lower respiratory infection rate was 2.5. Physiotherapy and exercise were applied daily, nutrition was optimized, and environmental pollutants (including tobacco smoke) were avoided. All these methods reduce symptoms and levels of inflammatory markers and improve quality of life. Spirometry was repeatedly performed once per year. Lung function did not deteriorate during the 7-year follow-up: chest CT was used to monitor disease progression every two years. Radiological findings showed no changes; even mild regression of bronchiectasis (Fig. 4).

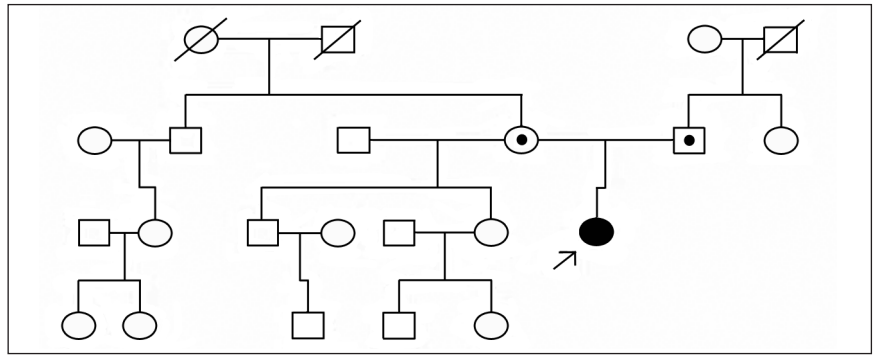

Fig. 2. A pedigree of the proband's family
The proband is indicated by an arrow

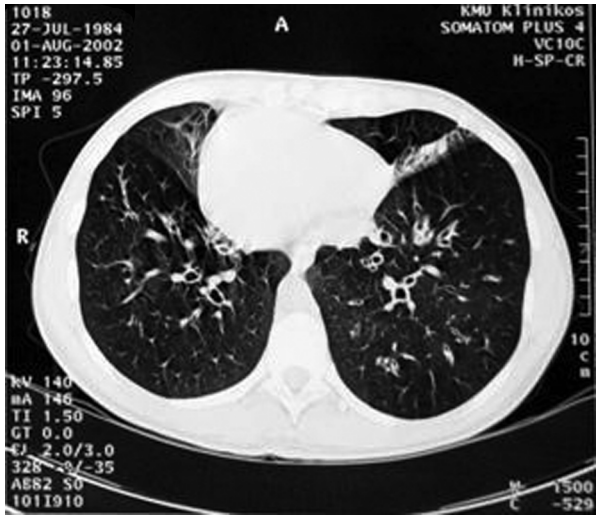

Fig. 3. Chest computed tomography at the age of 18

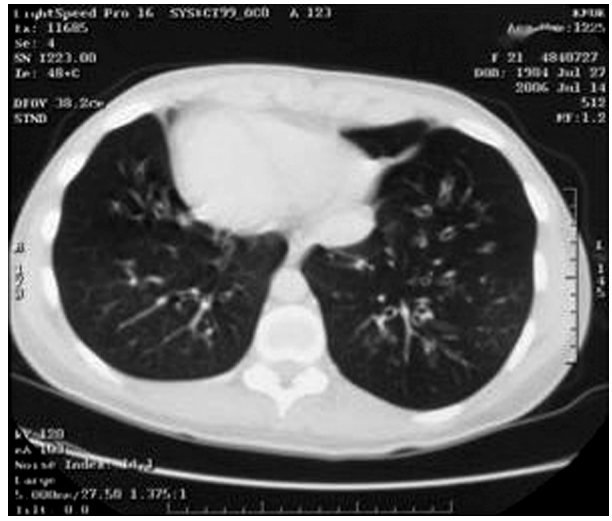

Fig. 4. Chest computed tomography at the age of 21

DISCUSSION

The clinical features of Kartagener's syndrome are productive cough, respiratory tract infections, sinusitis, otitis media, and infertility [6, 7]. The clinical phenotype in PCD is broad and overlaps with other chronic airways diseases [7]. The defect is congenital and symptoms are present from early life, which stresses the importance for pediatricians to be aware of this disorder as a relevant albeit rare, differential diagnosis in children with recurrent symptoms from upper and lower airways [4].

Our patient was diagnosed with Kartagener's syndrome at the age of 14. The diagnosis of PCD is often delayed until late childhood or adulthood as a consequence of the heterogeneous nature of the disease, lack of physician knowledge of disease characteristics, and the technical expertise required for an accurate diagnosis [3, 7]. In addition, the diagnosis of PCD may be delayed as the syndrome of bronchitis, sinusitis, and otitis is easily mistaken for common infections. Delay in recognizing the disease may lead to adverse consequences for patients, in terms of inadequate programs of care or inappropriate treatment [7, 8].

Patient's other genetic markers (AAT and IgA) were found to be protective (because of high concentration). The primary function of AAT is to inhibit neutrophil elastase in the lung interstitium and alveolar space. Elevated serum AAT can reflect a beneficial shift of the protease-antiprotease balance, the centre piece of the pathophysiological pathway mediating the effect of congenital AAT deficiency on chronic obstructive lung disease (COPD) and bronchiectasis. Secretory IgA is essential in protecting mucosal surfaces from infection. Detected higher AAT and IgA levels were independent from inflammatory state (CRP was normal). We hypothesize that these factors have been shown to be protected against infection and further bronchiectasis progression.

Respiratory management of bronchiectasis consists of regular respiratory monitoring, airway clearance by combination of physiotherapy and physical exercise, and aggressive treatment of upper and lower airways infections [9]. Our patient received a broad spectrum of curative methods: short courses of antibiotics, mucolytics, long-lasting bronchodilators and daily physiotherapy. Generally, antibiotics are used acutely with disease exacerbation and are prescribed based on bacteria grown in the last sputum culture. The aim of treatment should be prevention of chronic lung damage and bronchiectasis [10]. The twin pillars of respiratory treatment are antibiotic treatment and chest physiotherapy. Physiotherapy is essential for augmenting airway clearance in order to delay the onset and progression of obstructive airway disease [4, 10]. Physical exercise may help sputum clearance. Exercise has been shown to be a better bronchodilator than the use of bronchodilators in PCD [9]. The prognosis is generally considered good, usually with a normal life expectancy. Monitoring for progression of lung disease should be an important part of the regular clinic visit [3]. Our patient was followed up with regular visits every 6 months, including additional visits during exacerbations.

The present clinical case demonstrated reversibility of bronchiectasis even in congenital Kartagener's syndrome, thus indicating that bronchiectasis progression is a complex interrelationship between genetic variation and a proper nonspecific management.

Received 14 August 2011
Accepted 19 October 2011

References

1. Cichocka-Jarosz E, Jedynak-Wasowicz U, Głodzik I, Lis G, Pietrzyk JJ. Primary ciliary dyskinesia in highlights of consensus statement. Przegl Lek 2010; 67(2): 135–40.
2. McManus IC, Mitchison HM, Chung EM, Stubbings GF, Martin N. Primary ciliary dyskinesia (Siewert's/Kartagener's Syndrome): respiratory symptoms and psychosocial impact. BMC Pulm Med 2003; 3: 4.
3. Leigh MW, Pittman JE, Carson JL, Ferkol TW, Dell SD, Davis SD et al. Clinical and genetic aspects of primary ciliary dyskinesia / Kartagener syndrome. Genet Med 2009; 11(7): 473–87.
4. Ellerman A, Bisgaard H. Longitudinal study of lung function in a cohort of primary ciliary dyskinesia. Eur Respir J 1997; 10(10): 2376–9.
5. Santamaria F, Montella S, Tiddens HA, Guidi G, Casotti V, Maglione M et al. Structural and functional lung disease in primary ciliary dyskinesia. Chest 2008; 134(2): 351–7.
6. Skeik N, Jabr FI. Kartagener syndrome. Int J Gen Med 2011; 4: 41–3.
7. Noone PG, Leigh MW, Sannuti A, Minnix SL, Carson JL, Hazucha M. Primary ciliary dyskinesia: diagnostic and phenotypic features. Am J Respir Crit Care Med 2004; 169(4): 459–67.
8. Ortega HA, Vega Nde A, Santos BQ, Maia GT. Primary ciliary dyskinesia: considerations regarding six cases of Kartagener syndrome. J Bras Pneumol 2007; 33(5): 602–8.
9. Bush A, Chodhari R, Collins N, Copeland F, Hall P, Harcourt J et al. Primary ciliary dyskinesia: current state of the art. Arch Dis Child 2007; 92: 1136–40.
10. Chang AB, Grimwood K, Maguire G, King PT, Morris PS, Torzillo PJ. Management of bronchiectasis and chronic suppurative lung disease in indigenous children and adults from rural and remote Australian communities. Med J Aust 2008; 189: 386–93.

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BRONCHEKTAZIŲ GRĮŽTAMUMAS SERGANT KARTAGENERIO SINDROMU

Santrauka

Kartagenerio sindromas yra reta autosominiu recesyviniu būdu paveldima genetinė liga, sukelianti progresuojantį kvėpavimo sistemos pažeidimą ir atvirkštinę organų padėtį. Nors nėra įrodymais pagrįstų duomenų apie Kartagenerio sindromo efektyvius gydymo metodus, tačiau labai svarbu tinkamai šiuos ligonius gydyti ir stebėti jų būklę. Pristatome klinikinį atvejį dvidešimtpenkerių metų moters, kuriai diagnozuotas Kartagenerio sindromas. Krūtinės ląstos kompiuterine tomograma nustatyta dekstrokardija bei bronchektazės. Po septynerių metų buvo matyti geras gydymo efektas: mažiau ženklūs radiologiniai pakitimai ir stabili kvėpavimo funkcija. Straipsnyje aptariama įvairių genetinių veiksnių sąveika bei nespecifiniu Kartagenerio sindromu sergančiųjų priežiūra.

Raktažodžiai: Kartagenerio sindromas, dekstrokardija, bronchektazės