

# Anaesthesia in aspirin-induced asthma

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## ABSTRACT

The triad of bronchial asthma, nasal polyposis, and intolerance to aspirin and aspirin-like chemicals are designated aspirin-induced asthma (AIA) or Samter's syndrome. The exact mechanism of the disease is unknown but it is thought to be a disorder of arachidonic acid metabolism.

These patients are frequently referred to allergy clinics for preoperative evaluation for possible anesthetic agent sensitivity, requiring anesthesia for nasal polypectomy or several other reasons. Anesthetists must be aware of their pulmonary dysfunction, because the anesthetic management of asthma requires a specific approach. Marked cross-sensitivity with NSAIDs, which may also precipitate severe bronchospasm and adverse reactions, is the main problem faced by anesthetists in postoperative pain management. This article discusses the relationship between AIA and anesthesia. We also present our experience with 47 patients diagnosed with AIA between 1991 and 2003 in the department of chest diseases and adult allergy unit who underwent surgery requiring general anesthesia.

In conclusion, preoperative evaluation of these patients and collaboration between the allergists and anesthesiologists is essential to prevent preoperative, perioperative and postoperative complications.

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**Key words:** Aspirin-induced asthma. Analgesic intolerance. Bronchial asthma. General anesthesia.

## RESUMEN

La tríada asma bronquial, poliposis nasal e intolerancia a la aspirina y fármacos análogos se designa como asma inducida por aspirina (AIA) o síndrome de Samter. Se desconoce el mecanismo exacto de la enfermedad, pero se sugiere que es un trastorno del metabolismo del ácido araquidónico.

Este grupo de pacientes suelen remitirse a clínicas de alergología para someterse a un examen preoperatorio que determine posibles sensibilidades a agentes anestésicos. Estos pacientes se someten a anestesia en la polipectomía nasal o por otros motivos. Los anestesistas deben ser conscientes de su disfunción pulmonar, ya que el control anestésico en el asma requiere un enfoque específico.

El principal problema al que se enfrentan los anestesistas en el control postoperatorio del dolor es una marcada sensibilidad cruzada a los fármacos antiinflamatorios no esteroideos (AINE), que además puede provocar broncoespasmo y reacciones adversas graves. Este artículo trata de la relación entre el AIA y la anestesia, y muestra nuestra experiencia con 47 pacientes a los que se había diagnosticado AIA entre 1991 y 2003 en el departamento de enfermedades torácicas y la unidad de alergología de adultos. Posteriormente, los pacientes habían sido operados con anestesia general.

En conclusión, el examen preoperatorio de estos pacientes y la colaboración entre alergólogos y anestesistas son importantes para la prevención de las complicaciones preoperatorias y postoperatorias.

**Palabras clave:** Asma inducida por aspirina. Intolerancia a analgésicos. Asma bronquial. Anestesia general.

## INTRODUCTION

Although the prevalence of analgesic intolerance (AI) has been reported to be about 1 % in general population, its incidence rises in some special conditions like *bronchial asthma*. AI affects 10 % of the adult asthmatics and about one fourth of the patients with nasal polyposis and chronic urticaria<sup>1</sup>. The triad of asthma, nasal polyposis and analgesic intolerance has been called as aspirin-induced asthma (AIA) or Samter's syndrome<sup>1-9</sup>. It has been accepted that hereditary tendency play a role in both AI and AIA. Severe and protracted symptoms are superimposed on a background of aggressive inflammation of the airways in AIA. Pansinusitis and nasal polyposis may also easily exacerbate on the inflamed upper airways<sup>1-9</sup>. Recent advances in AIA have demonstrated an altered arachidonic acid metabolism with cysteinil leukotriene overproduction<sup>1-3,5,6,10</sup>.

Although several other allergic conditions may accompany AI, the reports in the literature are usually about asthma<sup>1,3,5,11,12</sup>. The most bothersome issue about these patients concerning the physicians is the possible cross-sensitivity of the AIA/AI patients to general anaesthetic agents. It is well known that there are quite frequent cross-reactions between some analgesics and antibiotics, but it is not clear if there is a relation between analgesic intolerance and general anaesthesia. This uncertainty sometimes leads to the postponement of an important operation and sometimes the performance of unnecessary, time-consuming and expensive serologic allergy tests with low sensitivity and specificity.

A marked cross sensitivity with NSAIDs, which may also precipitate severe bronchospasm and adverse reactions, is the main problem for the anaesthetists regarding post-operative pain management. Unfortunately, all the NSAIDs favoured currently by anaesthetists (including diclofenac, ibuprofen, indomethacin, ketoprofen, ketorolac and piroxicam, metamizole) are extremely potent cyclooxygenase inhibitors and are implicated in this problem<sup>1-3,5-7,9,12</sup>.

Paradoxically, some NSAIDs, including sodium salicylate, choline, magnesium trisilicate and salicylamide are well tolerated by aspirin-sensitive asthmatic patients probably because they do not inhibit the cyclo-oxygenase enzyme. Although paracetamol is safe for most of the aspirin sensitive patients some cases of intolerance have been reported<sup>1,2,5</sup>.

Patients with aspirin sensitivity confront anaesthesia for nasal polypectomy or several other reasons. Anaesthetists must be aware of their pulmonary dysfunction, because anaesthetic management of asthma needs specific approach.

The aim of this article was to mention the perioperative and postoperative general anaesthesia related allergic problems in patients with AIA and/or AI who have been evaluated by an allergist preoperatively and received a special general anaesthesia protocol used for the asthmatic patients.

## ANAESTHETIC MANAGEMENT OF THE AIA PATIENTS

Asthma is a common obstructive lung disease with a hallmark of airway inflammation, and hyperreactivity in response to a variety of stimuli. The characteristic of the disease is resistance to airflow. Elevated airway resistance and air trapping increases the work of breathing; respiratory gas exchange is impaired because of ventilation/perfusion imbalance. The predominance of expiratory airflow resistance results in air trapping; increase in residual volume and total lung capacity. Wheezing is a common physical finding that represents turbulent airflow<sup>13</sup>.

The clinical history is important during the preoperative assessment. No or minimal dyspnoea, wheezing or cough must be achieved, and complete resolution of exacerbation should be confirmed by chest auscultation. Pulmonary function testing; particularly expiratory airflow measurements and peak expiratory flow rate and chest radiogram should be used to confirm clinical impressions.

Asthmatic patients with active bronchospasm presenting for emergency surgery should undergo a period of intensive treatment. Supplemental oxygen aerosolised  $\beta_2$  agonists or intravenous glucocorticoid; due to their bronchodilator, anti-inflammatory and membrane stabilizing effects respectively, can dramatically improve lung function in a few hours.

Bronchodilators should be continued up to the time of surgery. Patients who have been receiving long-term glucocorticoid therapy should be given supplemental doses to compensate for adrenal suppression<sup>13</sup>.

Preoperative sedation is important, especially for the patients whose disease has an emotional component. Benzodiazepines are the drugs of choice for this purpose<sup>13</sup>.

The most critical time for an asthmatic patient undergoing general anaesthesia is during instrumentation of the airway. Pain, emotional stress or stimulation during light general anaesthesia may precipitate

bronchospasm. The cornerstone of general anaesthesia is a smooth induction avoiding drugs with histamine releasing property such as thiopental, mepidine, morphine, atracurium, mivacurium and succinylcholine. Propofol and etomidate are suitable agents for induction. Ketamine is the only agent that has bronchodilating property, especially suitable for the patients who are hemodynamically unstable. Vecuronium bromide is the muscle relaxant of choice. Volatile anaesthetics with their bronchodilating properties can be safely used for the maintenance of anaesthesia. It must be remembered that halothane may sensitise the heart to aminophylline and  $\beta$ -adrenergic agonists administered during anaesthesia. Ventilation should be controlled with warmed, humidified gasses if possible under capnographic monitoring. Intraoperative bronchospasm is usually manifested as wheezing, increased peak inflation pressures, decreased exhaled tidal volumes. The first approach must be deepening the anaesthesia. If wheezing does not resolve, obstruction of the endotracheal tube, pulmonary oedema or embolism, bronchospasm must be excluded. Bronchospasm should be treated with  $\beta$ -adrenergic agonist, and steroids<sup>13</sup>.

At the end of the surgery, reversal of nondepolarizing neuromuscular blocking agents with anticholinesterase does not precipitate bronchoconstriction if preceded by appropriate dose of an anticholinergic. Extubation must be performed under deep general anaesthesia to avoid bronchospasm<sup>13</sup>.

It must be remembered that high spinal and epidural anaesthesia may aggravate bronchospasm by blocking sympathetic tone to the lower airway. Vagal afferents in the bronchi are sensitive to histamine and several noxious stimuli. Reflex vagal activation results in bronchoconstriction, which is mediated by an increase in intracellular cyclic guanosine monophosphate<sup>13,14</sup>.

One of the problems for the anaesthesiologists in AIA is the marked cross sensitivity with NSAIDs, which are used in pain management. Analgesics causing histamine release such as morphine, mepidine may also precipitate severe bronchospasm and other adverse reactions in susceptible individuals<sup>5</sup>. Fentanyl, a potent narcotic analgesic is used for early postoperative pain management whereas safe alternative analgesics referred by allergy clinics were used for the late ones.

We had experienced 47 patients who had been diagnosed as AIA between 1991 and 2003 in the department of chest diseases and adult allergy unit then who had been operated under general anaesthesia. The mean age of the 47 patients was  $43.7 \pm 14.01$  and 30 (63.8%) were females similar to the literature<sup>1,3</sup>. Fifty-three surgical procedures were

performed under general anaesthesia for 47 AIA patients. The types of surgery were as follows; Ear, nose and throat 35 (66%), orthopaedic 5 (9.4%), general surgery 10 (18.8%), thoracic 2 (3.7%), urologic 1 (1.8%) procedures<sup>15</sup>. No complications have appeared in relation to anaesthesia and pain management except in a 44-year-old woman with AIA who had a reaction in the postoperative period after receiving an inappropriate analgesic. Although contraindication for metamizol application was noted in her file, it was administered to a patient for postoperative pain relief two hours after leaving post anaesthetic care unit depending on the information the patient had given. This 44-year-old woman having AIA was admitted to the intensive care unit because of acute urticaria and arrhythmia and followed up over a night. We must bear in mind that the data about the safe drugs must be taken from the notes of allergists in the file instead of the patient himself/herself, because general anaesthesia may cause a loss in cognitive functions for several hours or even days<sup>9-16</sup>.

## CONCLUSION

It may be concluded that, preoperative evaluation and preparation of AIA patients in collaboration with allergy and anaesthesiology clinics and the suitable anaesthetic approach in all types of surgical procedures is important for the prevention of preoperative, perioperative and postoperative complications.

According to our standard anaesthesia protocol for AIA patients; atropine and diazepam in the premedication, propofol and fentanyl during induction, muscle relaxation facilitation by vecuronium and sevoflurane or isoflurane for maintenance, fentanyl, a potent narcotic analgesic, and safe alternative analgesics referred by allergy clinics for early postoperative analgesia, seem to be the safe anaesthetic approach for AIA patients.

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