

Belgian Society of Pneumology. Guidelines on the management of spontaneous pneumothorax

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Description of levels of evidence (system developed by the National Heart, Lung, and Blood Institute)

Evidence Category	Sources of evidence	Definition
A	Randomized controlled trials (RCTs) Rich body of data	Evidence is from endpoints of well-designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.
B	RCTs Limited body of data	Evidence is from endpoints of intervention studies that include only a limited number of patients, posthoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, Category B pertains when few randomised trials exist, they are small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.
C	Non randomised trials Observational studies	Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.
D	Panel consensus judgment	This category is used only in cases where the provision of some guidance was deemed valuable but the clinical literature addressing the subject was deemed insufficient to justify placement in one of the other categories. The panel Consensus is based on clinical experience or knowledge that does not meet the above-listed criteria.

Which patients are concerned by this consensus statement ?

Patients with spontaneous pneumothorax (SP) defined by the presence of air within the pleural space excluding patients with pneumothorax of other aetiologies (traumatic, iatrogenic,...).

Distinction can be made between primary (PSP) (no clinically apparent underlying lung disease) and secondary pneumothorax (SSP) (e.g., COPD, cystic fibrosis,...).

What is known about epidemiology of SP ?

Incidence of PSP and SSP in the general population is comparable. Typical characteristics of PSP are male gender, young adult age, tall and lean physique and cigarettes smoking. SSP is mainly secondary to COPD and occurs in older age groups.

What is the clinical presentation ?

Most patients present with sudden thoracic pain and breathlessness of varying intensity. On average, symptoms (especially breathlessness) are more severe in SSP than PSP. Severity of symptoms is poorly correlated with pneumothorax size. Tension pneumothorax is a very rare presentation. Pneumothorax usually occurs at rest. Clinical signs include decreased breath sounds and hyperresonant percussion.

How to make the diagnosis ?

PA Chest X-ray is the key diagnostic test. Expiratory films are not indicated. A mediastinal shift is not specific for tension pneumothorax. In SSP, CT scan may help to differentiate between pneumothorax and bullous disease. Routine CT scan is not indicated in PSP.

How to assess the size of pneumothorax ?

There is no uniform way to assess the size despite the fact that this is a major factor used to guide therapeutic strategy. For clinical practice, size is assessed on PA chest X-ray mainly by the Light Index and the apex to cupula distance. Because of the routine use of digitalised X-rays, measurements in absolute values are no longer applicable. In the present text, lung dehiscence over the whole length of lateral chest wall is defined as a large pneumothorax, in which case the Light index can be used with a cut-off point of 20% guiding therapeutic strategy. The Light-index is calculated as follows : size of PTX (in %) = $(1 - D_L^3 / D_{HT}^3) \times 100$ where D_L is the diameter of the lung measured at the hilar level and D_{HT} is the internal diameter of the hemithorax measured at the hilar level. In general, a partial pneumothorax (apical,...) is defined as small.

What is the tendency of SSP and PSP for recurrence ?

Recurrence rate in PSP averages 30% and occurs mainly in the first year after the first event. In SSP recurrence rate is higher and is associated with an increased mortality rate. Both factors depend upon the underlying lung disease.

How should we treat a first episode of PSP ?

In case of a small and minimally symptomatic PSP, observation and outpatient follow-up including chest X-Ray control within 24 hours is recommended (evidence C).

In case of symptomatic and/or large PSP, initial treatment is limited to air evacuation either by simple aspiration or by the introduction of a small-bore catheter attached to a Heimlich valve or under water seal. There is no advantage in using immediate active suction (evidence B).

In case of failure of simple manual aspiration (incomplete lung reexpansion and/or continuous air leak), intercostal tube drainage using a small tube (16F maximum) is recommended (evidence C).

Air suction (low pressure) may be used in case of persistent (two days) air leak and/or incomplete lung reexpansion (evidence C).

In case of persistent (4 to 7 days) air leak and/or incomplete lung reexpansion, an invasive procedure is recommended (see paragraph invasive procedures) and should be preferred over chemical pleurodesis through the chest tube (evidence D).

How should we treat a first episode of SSP ?

Hospitalization for at least 24 hours is recommended (evidence D).

In case of minimally symptomatic and small SSP, observation may be considered (evidence C) and oxygen administration is recommended (evidence B).

In all other cases, air evacuation procedures followed by recurrence prevention procedures are indicated.

Simple aspiration is less likely to be successful than in PSP and is only recommended in symptomatic patients with small pneumothorax (evidence C).

Intercostal tube drainage using a small tube (16F maximum) attached to a water seal or Heimlich valve is recommended in all other cases except in case of patients at risk for mechanical ventilation in whom larger tubes should be used (evidence C).

Air suction (low pressure) may be used in case of persistent (two days) air leak and/or incomplete lung reexpansion (evidence C).

In case of persistent (4 to 7 days) air leak and/or incomplete lung reexpansion, an invasive procedure is recommended (see paragraph invasive procedures). Chemical pleurodesis through the chest tube may be considered in patients unable or unwilling to undergo invasive procedures (evidence D).

Because of the higher rate of recurrence and higher mortality rate, recurrence prevention is recommended after the first episode (evidence D), the choice of which depends upon the underlying lung disease and its potential future treatment as well as upon patient condition.

How to place chest tube ?

Usually a chest drain or catheter is inserted in the 2nd intercostal space on the midclavicular line or laterally on the midaxillary line in the 4th or 5th intercostal space under local anaesthesia. It is recommended to direct the drain or catheter to the apex of the chest in order to evacuate the air efficiently. In case of partial collapse or recurrent pneumothorax the site of insertion depends on the precise localization of the present air cavity. In any case caution should be used not to damage the underlying lung or mediastinal structures (evidence D).

How and when to remove chest tube ?

Provided the air leak has stopped and the lung is completely reexpanded, the chest tube can be removed safely. In case of doubt, a few hours of clamping with chest X-ray control is indicated (evidence D).

Which invasive procedure should be chosen ?

Open thoracotomy with total pleurectomy has the lowest recurrence rate (evidence A) but is an aggressive procedure that is not indicated in the majority of the cases (evidence D). Other pleurodesis techniques (partial pleurectomy, pleural abrasion and talc poudrage) are associated with somewhat higher recurrence rates but they seem to

be equally effective among themselves (evidence C). Use of talc may be associated with difficulties in case of surgical reintervention.

VATS and axillary thoracotomy are procedures with similar results (evidence B) but VATS provides superior visualization of the thoracic cavity (evidence D). In particular in PSP there is no consensus on the treatment of blebs or bullae except when they are leaking.

Which treatment in case of recurrent ipsilateral, first contralateral, bilateral pneumothorax or haemopneumothorax ?

Immediate invasive procedures are recommended after initial treatment (evidence D). The same is true after a first pneumothorax episode for professions considered at risk (professional divers, flying personnel).

Smoking cessation recommendation

Despite the absence of evidence on the relationship between smoking cessation and pneumothorax recurrence, smoking cessation remains a health priority.