

from the pleural liquid as in our case. We conclude that, although empyema due to *L. pneumophila* is infrequent, it should be taken into consideration and, therefore, in geographical regions with a high prevalence, *Legionella* should be included in the protocol of invasive respiratory sample studies.

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Hiccups Induced by Midazolam During Sedation in Flexible Bronchoscopy[☆]

Hipo inducido por midazolam durante la sedación en fibrobronoscopia

Dear Editor:

Midazolam is one of the most frequently used benzodiazepines for the conscious sedation used during bronchoscopy. It is highly satisfactory and tolerated by the patients without contraindications,¹ and it reduces the difficulty in performing the bronchoscopy technique by making it shorter. Its properties include its acting as a sedative, amnesiac, muscle relaxant, anxiolytic and anti-convulsive.² Despite being such a safe drug, it is necessary to know its possible risks in order to provide proper patient care and to optimize its use.

We performed flexible bronchoscopy on a 49-year-old non-smoker female patient who had previously occasionally taken benzodiazepines at home with no adverse effects. The patient was being studied due to mild hemoptoic expectoration with no other accompanying symptoms but with a bilateral pulmonary micronodular pattern on chest radiography. We administered 2 mg of 2% topical intranasal lidocaine and 2 mg of midazolam intravenously. Approximately one minute after the administration of the midazolam, we observed a case of adult hiccup that did not resolve after the intravenous administration of 10 mg of metoclopramide. It did, however, stop immediately after the later administration of 1 mg of intravenous flumazenil; therefore, we can establish the relationship with the drug. It was necessary to perform a second bronchoscopy in the same patient in which, once again, 3 mg of midazolam was administered after the previous perfusion of metoclopramide, and no hiccup episode occurred on this occasion. The final diagnosis obtained was advanced-stage lung adenocarcinoma.

Although it has been reported that various types of drugs are able to induce hiccup infrequently, especially corticosteroids and benzodiazepines (dexamethasone, methylprednisolone, chloridiazepoxide and midazolam among others),³ it has been considered that there is little scientific evidence to definitively attribute the association to any one of them.⁴ Nevertheless, in children a

significant incidence of hiccupping has been observed after the administration of midazolam, especially in those of younger ages.⁵

Although we know that benzodiazepines act on the central nervous system, the mechanism by which midazolam induces hiccup as an adverse reaction has not been clearly explained.⁶ It seems to be related with the GABA neurotransmitters, which it stimulates to produce multiple effects, but this is not exactly clear.

In our case, the rapid response to flumazenil makes it quite likely that the appearance of hiccup can be attributed to midazolam.

We believe it is interesting to report that the presence of hiccup during bronchoscopy may be due to the use of midazolam and, if required, it may be easily reverted with flumazenil as this is a competitive antagonist of the receptors of short-acting benzodiazepines. In addition, it seems worthy to note that, as we have observed in our experience, the drug may be used once again in the same patient without major risk.

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