1. Patient was noted to have pneumoperitoneum on XR imaging without signs of infection or peritonitis. He continued to be free of abdominal complaints while repeat XR and then CT continued to show pneumoperitoneum. He did not have any recent surgeries or medical interventions other than a tooth extraction without known complications. General surgery was consulted and given his absence of peritoneal signs, fever, or leukocytosis they recommended observation only. The questions posed from this case were
   a. the etiology and mechanisms of nonsurgical pneumoperitoneum (NSP)
   b. indications for observation of patients with pneumoperitoneum

2. The article was found by searching PubMed clinical queries using nonsurgical and pneumoperitoneum within the etiologic category with a broad scope which returned 4 articles.

3. The review is a meta-analysis of case reports of NSP (pneumoperitoneum that was successfully managed with observation or a diagnostic laparotomy was performed without evidence of a perforated viscus not requiring additional surgical intervention). The cases were identified by a MEDLINE search with keywords pneumoperitoneum and benign, nonsurgical, spontaneous, iatrogenic, barotrauma, pneumatoses, diaphragmatic defects, free air, mechanical ventilation, gynecologic, and pelvic. They also performed a review of NSP etiologies where the prevalence of this finding was established. The purpose of the review was to increase the awareness NSP (given that it accounts for 5-15% of cases of pneumoperitoneum) which may be managed by observation when peritonitis and signs of systemic infection are absent.
   a. Inclusion criteria: NSP as above published in English between the years 1970-1999
   b. Exclusion criteria: cases studies for etiologies were the prevalence of pneumoperitoneum has already been determined. An unstated exclusion were cases of presumed NSP that were not successfully managed with observation.

The review does show that selected cases of NSP can be managed without surgical intervention. However, it cannot be extrapolated to include cases of NSP where the outcome is not known as it is only retrospective and did not try to identify cases believed to be NSP that were actually associated with a perforated viscus.

4. The above search generated 196 case reports of NSP. 151 of them were managed with observation alone and 45 had a diagnostic laparotomy without evidence of a perforated viscus. The cases were then categorized by based upon the anatomical source and etiology. (table 2, 3, and 4)
   a. Abdominal source (55 cases, 16.4% NDL)
   b. Thoracic source (85 cases, 27% NDL)
c. Gynecologic source (15 cases, 13.3% NDL)
d. Idiopathic (36 cases, 30.6% NDL)

A concise review of NSP secondary to etiologies with an established prevalence was discussed. (table 1)

5. The review does apply to our patient as he had NSP that was effectively managed with observation. However, it only applies to the case in hindsight as the study only looked NSP that was effectively managed with observation. Based upon the review our patient would be categorized as idiopathic with a sub-categorization of post dental extraction.

Additional review of the literature hints that the use of nitrous oxide for anaesthesia may contribute to pneumoperitoneum. The gas rapidly enters any air cavity given its high rate of diffusion. There are case reports that PCI cysts have been seen to enlarge during surgery when NO was used for induction and resolved soon after it was stopped. Nitrous oxide has a listed CI to use in any patient with pathological air containing cavity such as a pneumothorax or pneumoperitoneum.

6. The review is useful in our practice. When I encounter a patient with NSP it will help in the formulation of a differential diagnosis. The study did not include patients not “adequately managed by observation” and thus it does not imply that we should only observe patients with NSP. I would still consult the general surgery service and allow them to decide whether surgery is indicated. However, I would be better at identifying potential etiologies of NSP which would help the surgical team decide whether intervention is warranted. Finally, I would feel more comfortable observing a patient per a surgical recommendation.