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**Figure.** Right aspect of head in hard collar with halo sign on bed sheet. Used with permission of Brian James Burns, MD, St. Vincent's Hospital, Emergency Department, Darlinghurst, New South Wales, Australia.

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A 48-year-old woman presented to the emergency department (ED) after a severe blunt head injury. She had bilateral profuse epistaxis and right-sided perforated tympanic membrane with hemorrhage. Computed tomography (CT) of the brain showed an extensive base of skull fracture extending into the right external auditory bony canal. There was also fracture of the right-sided ethmoidal, sphenoid, and frontal sinus. After half an hour in the ED, a gross halo sign was observed.

*For the diagnosis and teaching points, see page 706.  
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### DIAGNOSIS:

*Traumatic cerebrospinal fluid leak.* Acute halo sign in the setting of trauma indicates a dural leak and a bony defect/fracture occurrence. Increased cerebrospinal fluid pressure prevents spontaneous closure of the disrupted defect in the dura. Trauma causes 90% of cerebrospinal fluid rhinorrhea and otorrhea. Two to 3% of head injuries result in cerebrospinal fluid rhinorrhea. Temporal bone fracture is associated with up to 20% incidence of otorrhea.<sup>1</sup> In trauma, the mixture of blood and cerebrospinal fluid makes diagnosis difficult. The halo sign may be seen when cerebrospinal fluid separates from blood on filter paper or on bed linen (Figure). Consideration may be given to the highly specific and sensitive  $\beta_2$ -transferrin immunofixation test to confirm diagnosis.<sup>1</sup> Unilateral rhinorrhea and otorrhea indicate the side of dural injury and cerebrospinal fluid leak. However, bilateral leak does not confer ability to diagnose the side of injury in rhinorrhea. Traumatic rhinorrhea indicates anterior cranial vault fracture. The cribriform plate is the most common site of injury.<sup>2</sup> Therefore, nasogastric tube insertion should be avoided. High-resolution CT is the investigation of choice to identify the causal bony injury.<sup>3</sup> The use of antibiotics in traumatic cerebrospinal fluid leak remains controversial.<sup>1</sup>

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