

## CT characteristics of COVID-19: reversed halo sign or target sign?

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Dear Editor,

In their Letter to the Editor, Görkem and Çetin (1) reported reversed halo sign (RHS) as an important finding observed in chest computed tomography (CT) of a 15-year-old girl with a confirmed diagnosis of COVID-19. The RHS corresponds to a focal rounded area of ground-glass opacity, surrounded by a ring of consolidation. A wide variety of diseases may be related to this sign, including pulmonary involvement by COVID-19. Nevertheless, in our opinion, a closer look at the images provided by Görkem and Çetin (1) shows some morphological aspects that differ from those of the RHS, such as the central punctiform component and the polygonal aspect of the lesion periphery. These findings are more likely related to a new tomographic sign, also described recently in patients with COVID-19, characterized by peripheral ring-like opacities and a central rounded ground-glass opacity (2, 3). Muller and Muller (2) suggested that these ring-like opacities indicate a pattern of organizing pneumonia reaction. They named this chest CT finding "the target sign", as it morphologically resembles a shooting target.

On detailed inspection, the peripheral wall of the CT target sign has a polygonal appearance in most patients. This pattern differs from the RHS, which generally has rounded or oval boundaries. The polygonal boundary is considered to represent the perilobular pattern, a characteristic finding of organizing pneumonia, consisting of thick, irregular polygonal or arcade-like opacities, with a peripheral distribution closely related to the inner surface of the interlobular septa (4). Despite its morphological distinctiveness, however, the target sign is often misinterpreted as the RHS.

Although the target sign and RHS have the same significance and represent organizing pneumonia, they must be differentiated, as the target sign seems to be more specific, described related only to infection with COVID-19. Special care should be taken when interpreting the RHS in patients with COVID-19. When an internal hypodensity is seen, with or without reticulation, pulmonary infarction should be suspected, and not organizing pneumonia (5).

### Conflict of interest disclosure

The authors declared no conflicts of interest.

### References

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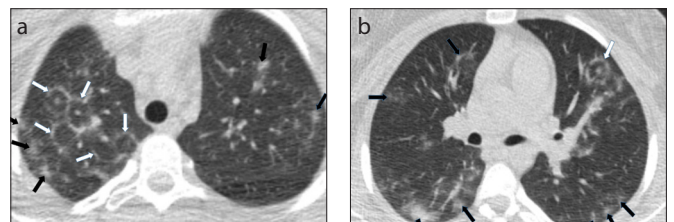
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## Author's Reply

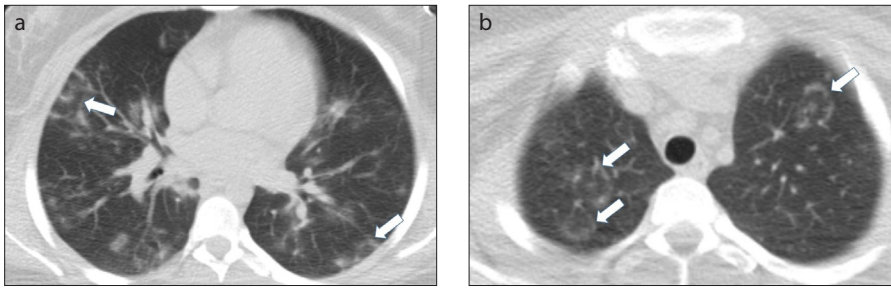
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We truly appreciate the detailed criticism of our manuscript and the broad explanation of the reversed halo sign and target sign according to the recent literature of adult COVID-19 patients. The crescentic appearance of the reversed halo sign is typical on CT whereas the target sign has a polygonal appearance peripherally. The recent literature included only adult patients; however, our case was an adolescent. The clinical status and radiological presentation of COVID-19 positive children with lung infiltrations differ from adult patients (1). Therefore, we disagree with the authors' claim regarding the correlation between the signs and severity of the disease since our case had discordance between lung infiltrations and clinical status. Moreover, not all signs in our case had a polygonal shape. The infiltrations had



**Figure 1.** a, b. Axial thorax CT images (a, b) demonstrate multiple multifocal reversed halo signs (white arrows) with a centrilobular dot-like nodule. Multifocal peripherally distributed patchy alveolar infiltrations and ground glass opacities are noted bilaterally (black arrows).



**Figure 2.** a, b. Axial thorax CT images (a, b) show round and crescentic infiltrations with or without a centrilobular dot (white arrows), which corresponds to target-shaped combined halo and reversed-halo sign.

both polygonal (Fig. 1a), round and crescentic shape (Fig. 1b, Fig. 2) with or with-

out a centrilobular dot in it. We think that it would be better to describe our findings

as a target-shaped combined halo and reversed-halo sign (2).

### References

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