



## Image Report

# Calvarial multiple myeloma: Raindrop skull

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## ABSTRACT

**Background:** The “Raindrop skull” appearance represents the multiple punched-out and lytic lesions hitting a surface and creating a scattered splash pattern.

**Case Description:** A 73-year-old female presented with multiple painless lumps over the forehead and head. The patient reported unintentional weight loss, fatigability, loss of appetite, fever, night sweats, and back pain for seven months (B symptoms). The examination revealed multiple, nonmobile, calvarial lesions with defined borders, measuring approximately 1 × 1 cm. Laboratory investigations of serum-free light chains showed a free kappa level of 12.91 mg/L, a lambda level of 4549.28 mg/L, and a free kappa/lambda ratio of 0.00. Radiological imaging of the skull and brain showed a “raindrop skull” appearance and multiple calvarial osteolytic lesions. The patient underwent a right superior iliac crest bone marrow aspirate and trephine biopsy. The laboratory and histopathological sections were compatible with multiple myeloma. A diagnosis of multiple myeloma (free light chain lambda) was rendered.

**Conclusion:** Calvarial multiple myeloma is rare and requires a high index of suspicion to diagnose. “Raindrop skull” appearance is pathognomonic of calvarial multiple myeloma.

**Keywords:** Kappa, Lambda, Osteolytic, Plasma cell, Skull

## CASE DESCRIPTION

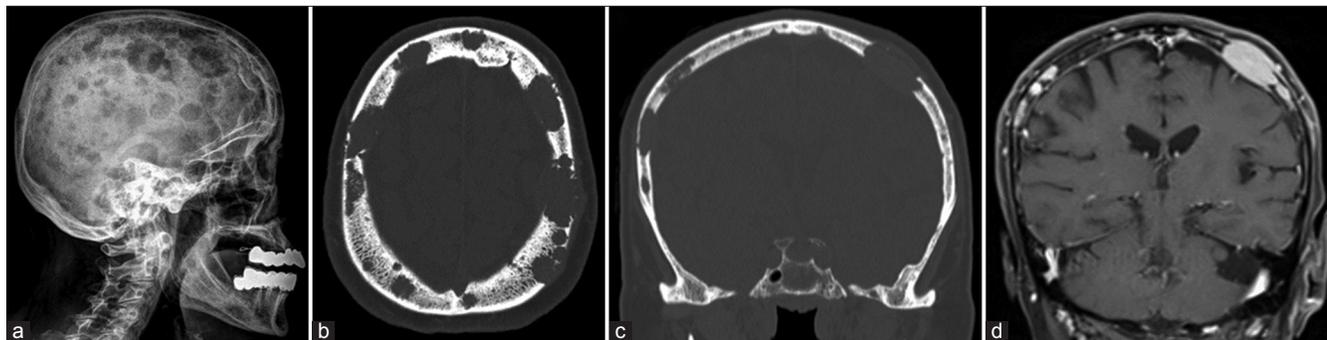
A 73-year-old female presented with multiple painless lumps over the forehead and head. The patient reported unintentional weight loss, fatigability, loss of appetite, fever, night sweats, and back pain for seven months (B symptoms). The examination revealed multiple, nonmobile, calvarial lesions with defined borders, measuring approximately 1 × 1 cm. No communicating sinuses, skin breakthroughs, or discharges were noted.

Laboratory investigations of serum free light chains showed free kappa level of 12.91 mg/L (reference range: 3.30–19.4 mg/L), lambda level of 4549.28 mg/L (reference range: 5.71–26.30 mg/L), and free kappa/lambda ratio of 0.00 (reference range: 0.26–1.65). Urine electrophoresis was notable for the Bence-Jones protein. A skeletal survey radiograph showed multiple compression fractures of the thoracolumbar spine and bilateral femoral lytic lesions. Radiological imaging of the skull and brain showed a “raindrop skull” appearance and multiple calvarial osteolytic lesions [Figure 1].

The patient underwent a right superior iliac crest bone marrow aspirate and trephine biopsy. The histopathological sections were compatible with multiple myeloma. Peripheral blood smear was notable for rouleaux formation of red blood cells. The immune profile was suggestive of plasma cell neoplasm (80% of total bone marrow cellularity). A diagnosis of multiple myeloma (free light

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**Figure 1:** (a) Lateral skull radiograph demonstrating the classic “raindrop skull” appearance. (b and c) Axial and coronal brain computed tomography, “bone window,” shows variable-sized, well-defined osteolytic lesions of the calvarial vault; the largest lesion measures 2.4 cm at the left frontal bone. (d) Coronal brain magnetic resonance imaging with contrast showing subgaleal and epidural soft tissue component enhancement. An incidental left cerebellar arachnoid cyst is noted. The brain parenchyma is unremarkable.

chain lambda) was rendered. The patient was commenced on immunotherapy (DARA-RD protocol; daratumumab, lenalidomide, and dexamethasone). She was discharged and followed up for one year and is still being followed up clinicoradiologically.

## DISCUSSION

The appearance of a “Raindrop skull” represents the multiple punched-out and lytic lesions hitting a surface and creating a scattered splash pattern.<sup>[3]</sup> The lesions are typically well-defined with nonsclerotic margins and endosteal scalloping.<sup>[1]</sup> Occasionally, the lesions may coalesce, forming larger osteolytic lesions.<sup>[1,2]</sup> “Raindrop skull” appearance is pathognomonic of calvarial multiple myeloma.<sup>[1,3]</sup> Occasionally, patients with a previous history of multiple myeloma may present with a single giant calvarial plasmacytoma.<sup>[2]</sup> Simsek *et al.* reported the oldest patient with a single giant calvarial plasmacytoma that was surgically resected.<sup>[2]</sup>

## CONCLUSION

The present article illustrates the clinical and radiological appearance of a patient with a classic “raindrop skull” appearance of calvarial multiple myeloma. Neurosurgeons should keep in mind the radiological appearance of such a rare finding in patients with multiple myeloma.

## Ethical approval

Ethical approval was obtained from King Abdullah International Medical Research Center. The assigned protocol number was IRB/2107/23.

## Declaration of patient consent

Patient’s consent not required as patient’s identity is not disclosed or compromised.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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