Answers to Medical Quiz

A1. The left condylar head is rather small with a well-defined expansive and somewhat rounded enlargement on the anterior aspect of the articular surface extending to the neck of the condyle. This abnormality has a moderately well corticated outline and gives the initial impression of a space occupying lesion. These features can point to a slow-growing, benign tumor but it doesn't totally rule out malignancy. The left glenoid fossa is relatively large with a shallow articular eminence. A similar but much less obvious enlargement is present on the right condylar head. Due to the abnormality being bilateral, a developmental anomaly or an extreme variation of the norm is more likely. One of the differential diagnoses was of a bilateral bifid mandibular condyle (BMC).

A2. Conventional radiographs are not adequate to reach a final diagnosis. Coronal computerized; tomography (CT) (Figure 1a, and 1b) scans or magnetic resonance imaging (MRI) would confirm the diagnosis and rule out the possibility of more sinister lesions (e.g. osteochondroma). The morphology of the bifidity, ranges from grooving to discrete lobulation of the condyles with two independent condylar necks. Lateral views e.g. sagittal tomography, are unreliable for diagnosing developmental BMC since they give an anteroposterior view but a coronal CT/MRI will give a better perception of the medio-lateral condylar duplication.

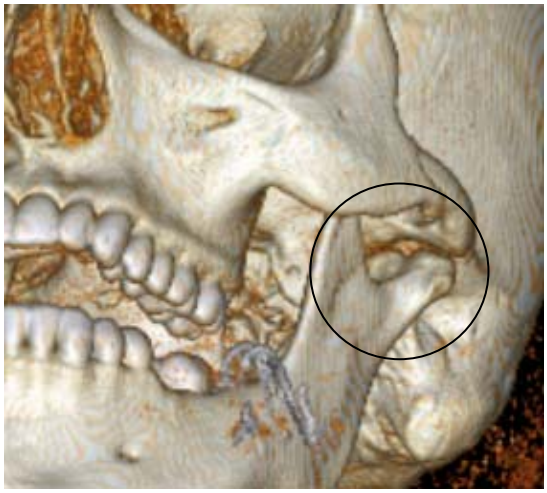

Figure 1a: A 3D CT Scan Rendering of the Left Condyle Showing Clear Bifidity (Black Circle)

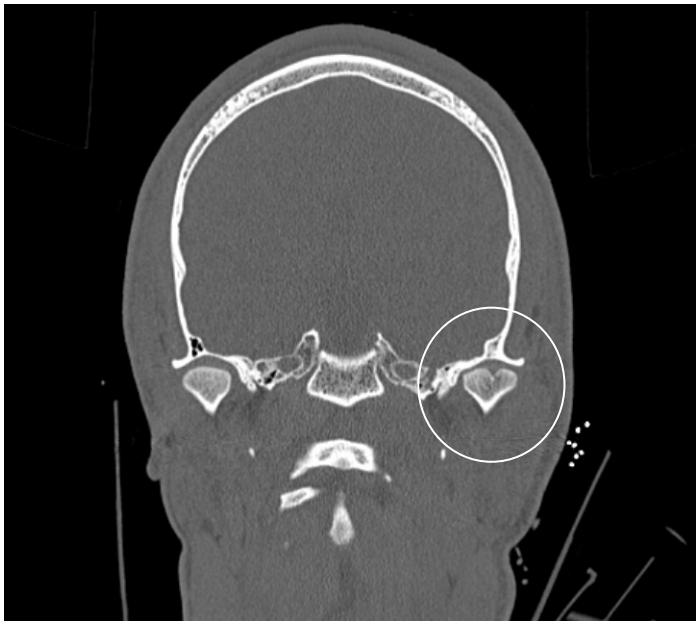

Figure 1b: A Coronal CT Scan Demonstrating the Typical 'Heart-Shaped' Appearance of the Lobulated Condylar Head (White Circle)

A3. Conservative treatment: observation with yearly review appointments is recommended. Patients with bifid condyles are actively treated only if they are symptomatic, and the type of treatment depends on the severity of these symptoms.

DISCUSSION

BMC is an exceptionally rare phenomenon, and is usually identified by clinicians as an incidental, unilateral finding[1,2]. It is important to note that most of the cases reported to date, have occurred unilaterally and predominantly on the left side. The first recorded description of the condition was in 1941[3]. The literature review by Shriki et al, in 2005, identified only 56 cases of this rare anomaly (Table 1)[4]. We have modified this table to include more recent case reports, and as far as we could find there is a total of 84 reported cases to date, two of which were trifid condyles[5,6].

Table 1: Cases of Bifid Condyles Reported in Literature, Modified from Shriki et al[3]

	Living Cases	Cadaveric Cases
Hrdlicka (1941)		21
Sicher (1948)	1	
Moffett (1966)		1
Stadnicki (1971)	1	1
Lysell and Oberg (1975)	1	
Farmand (1981)	1	
Forman and Smith (1984)	2	
Balciunas (1986)	1	
Thomason and Yusuf (1986)	2	
Gundlach et al (1987)	4	1
Zohar and Laurian (1987)	1	

Sahm and Witt (1989)	1	
Szenpetery et al (1990)		8
Phillips and Delzer (1992)	1	
Antoniades et al (1993)	1	
Fields and Frederiksen (1993)	1	
Cowan and Ferguson (1993)	1	
Stephanou et al (1998)	4	
Garcia-Gonzalez et al (2000)	1	
Artvinli et al (2003)	1 (trifid)	
de Sales et al (2004)	1	
Antoniades et al (2004)	1 (trifid)	
Hersek et al (2004)	1	
Alpaslan et al (2004)	1	
Corchero-Martín et al (2005)	1	
Daniels et al (2005)	1	
Shriki et al (2005)	2	
Ramos et al (2006)	1	
Espinosa-Femenia et al (2006)	1	
Agarwal et al (2006)	4	
Açikgöz (2006)	1	
Tunçbilek et al (2006)	1	
Sales et al (2007)	1	
Menezes et al (2008)	9	
Dennison et al (2008)	1	
Total(s)	**52**	**32**

The cadaveric study of Szentpetery et al in 1990 of 1,882 skulls reported an incidence of 0.48%[7]. The bifid condyles do not appear to have any predilection for a particular age, race or gender[8]. While the Menezes et al 2008 study of 50,080 panoramic radiographs reported an even smaller incidence of 0.018% with a male to female ratio of 3:1[9].

There have also been a few cases of bifid condyles associated with hemi-facial microsomia, and with temporomandibular joint (TMJ) ankylosis and rheumatoid arthritis[4,10,11].

The etiology is still uncertain, and there have been many theories proposed; such as recurrent infection, nutritional deficiency, irradiation and endocrine disorders. The most common three postulations in literature are:

Theory 1: Developmental: a retained fibrous septum or a vascular structure which impedes ossification of the mandible, and splits the condyle into two heads in a mediolateral (coronal) orientation[12]. Some have gone as far as suggesting a developmentally separate glenoid fossa for each of the duplicated parts[7].

Theory 2: Traumatic: trauma induced bifidity which usually manifests in an antero-posterior (sagittal) orientation, most probably due to its relation to the insertion of the lateral pterygoid muscle[1]. Intriguingly, there was a report of a three-year-old girl who

developed a bifid condyle with ankylosis in which obstetrical forceps were used in her delivery[13,14].

Theory 3: Teratogenic embryopathy: bifidity was induced when teratogenic material (N-methyl-N-nitrosourea and formhydroxamic acid) were injected into pregnant rats[15].

Recently, increasing numbers have been reported on living persons, most of them being asymptomatic and found on routine dental radiographic examination for other dental complaints. Loh et al reported that 67% of patients with BMC had no complaints related to the affected TMJ; however, symptoms have been found in some cases, which include pain, pre-auricular swelling, articular audible clicking/palpable crepitus and limited mouth opening with or without deviation toward the affected side[16,17].

Active treatment of BMC is purely dependant on the symptoms the patient presents with. As a senior colleague once remarked, “We treat patients and not radiographs”.

Therefore, no treatment is necessary if the patient is asymptomatic, but long-term follow-up is mandatory. Patients with associated arthropathy of the affected TMJ should be treated with occlusal splints and/or arthroscopic surgery to avoid future complications. Condylectomy and arthroplasty for functional repair is recommended in symptomatic cases and cases with associated articular ankylosis.

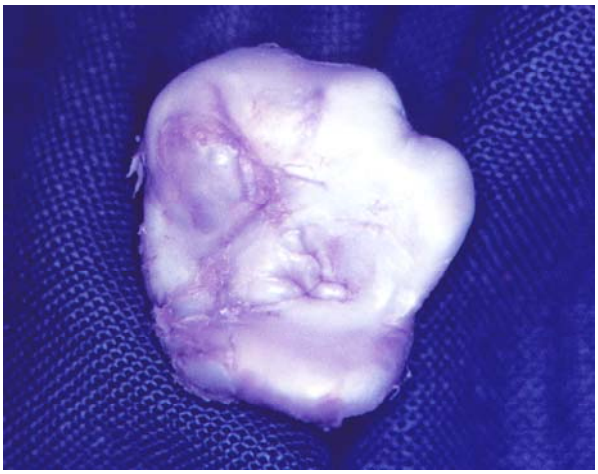

Figure 2: A Condylar Head Showing Minor Bifidity Following a Condyloplasty (Archived Image courtesy of Prof. R O'Sullivan)

Finally, both medical and dental professionals should be aware of this abnormality, as well as its implications for function and appropriate treatment modalities. However, it will remain an incidental finding of anatomic variation rather than a clinically informative observation until a large population-based study is undertaken.

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