

# CHAPTER 10

**SUMMARY**

In **Chapter 2**, visual and quantitative analysis of planar bone scintigrams of UCH patients and a control group was conducted, and the possibilities of using a bony structure in a region near the condyle for the objective measurement of bone activity were explored.

Visual interpretation of the bone scan revealed that all UCH patients had a unilateral increased activity. The mean percentile activity of the affected and unaffected condyles in the UCH group was 55.3% and 44.7%, respectively. There was no significant difference in the control group: the ratios between the left and right condyle being 49.5% and 50.5%, respectively. In the UCH group, a significant difference was noticed in the ratios between the region of interest (ROI) of the condyles on the one hand and the cervical spine, the lower part of the cervical spine, and the skull on the other hand. However, there was a considerable overlap between the condyle and reference ROI ratios. Calculation of ratios in planar scans therefore, does not appear to be useful in differentiating a hyperplastic condyle from a normal condyle. Furthermore, it can be concluded that quantitative analysis of planar scintigrams in UCH patients are not superior to the visual interpretation of scans.

In **Chapter 3**, single photon emission computed tomography (SPECT) and planar bone scintigraphy in the diagnosis of UCH patients were compared.

The mean relative activity of the hyperactive condylar region in the planar scans was 53.5%, which was significantly higher in the SPECT scan with a mean value of 60.5%. Receiver operating curves (ROC) were clearly in favor of SPECT over the planar bone scan. The optimal cut-off value for planar scanning was 52%, yielding a sensitivity of 67% and a specificity of 85%. For SPECT scanning, the optimal cut-off was 56%, resulting in a sensitivity of 93% and a specificity of 96%.

It can be concluded that in patients with a clinical suspicion of active UCH, SPECT scanning is a significantly better diagnostic tool than planar bone scanning.

---

In **Chapter 4**, different analytical methods were compared in order to identify the optimal analytical method to distinguish UCH patients from patients with inactive condyles. The SPECT scans of patients with progressive and non-progressive mandibular asymmetry were analyzed using the region of interest (ROI) technique. Sensitivity, specificity and receiver operating characteristic (ROC) curves were calculated for the different analytic methods. For UCH patients, a direct comparison of bone activity between the affected and contralateral condyle in SPECT scans is the analysis method of choice. Comparison of condylar bone activity to reference bone activity in SPECT scans does not have additional value in the diagnosis of UCH.

In **Chapter 5**, a review of the literature (1968-2008) was performed on the diagnostic accuracy of planar and SPECT bone scans. Fifteen articles met the inclusion criteria of this review. In only seven, the results were sufficient in detail to calculate index test characteristics. The pooled sensitivity of the planar bone scan was significantly lower than that of the bone SPECT technique. The pooled specificity of the SPECT scan was not significantly different from that of the planar scan. Therefore, it is recommended that future studies should include a diagnostic analysis of the reported data, including two-by-two contingency tables, allowing to evaluate the accuracy of the diagnostic test. A bone scan can best be performed by using the SPECT scanning technique, conducting a quantitative analysis by calculating the percentile differences between the left and right condylar region.

In **Chapter 6**, bone growth and blood flow in the condylar region of UCH patients and controls were prospectively assessed, using positron emission tomography (PET).

In controls, the net rate of fluoride influx rate ( $K_i$ ), representing bone metabolism, was similar for left and right condylar sides. Interestingly, this was not significantly different from the affected condyles in UCH patients.

Rather, the Ki on the contralateral side of UCH patients was reduced significantly compared to the affected side and controls.

The mean blood flow in the left and right condylar side in controls was not significantly different. The same was true for the hyperactive and contralateral condyle of UCH patients. Blood flow in the condylar region of UCH patients was similar to that of the control group.

In conclusion, no evidence for abnormal high rates of bone growth in the affected condylar region of UCH patients was found. On the contrary, the rate of bone growth appeared to be reduced in the contralateral condylar region. These PET results are in contrast with the characteristic clinical picture of UCH patients and suggest the possibility of subgroups in patients with a mandibular asymmetry caused by UCH. Furthermore, no evidence of hypervascularization of the condylar region in UCH patients was found.

In **Chapter 7**, histopathological analysis of condyles that were resected because of progressive UCH was performed, and the results of the bone scan were compared with the histopathological analysis.

The number of cartilage islands appeared to be highly variable, ranging from almost absent in 37% of the patients to abundant in 35% of the patients. Furthermore, the relative thickness of the cartilage layer exhibited considerable variation, ranging from less than a quarter of the total thickness of the condylar articular layer in 22% of the patients, to half of the total thickness in 35%. No significant relationship was demonstrated between the number of cartilage islands and bone activity using SPECT, or between the relative thickness of the cartilage layer and bone activity using SPECT.

Unilateral condylar bone growth can occur without large numbers of cartilage islands and without abundant cartilage formation. Bone activity measured by bone scintigraphy was not related to the histological results. Histopathological examination of resected condyles in UCH can not, therefore, be used as a gold standard.

---

In **Chapter 8**, the temporomandibular function after a condylectomy because of unilateral condylar hyperactivity (UCH) was assessed by means of standardized criteria. The results were compared with those obtained in a control group.

It appeared that patients and controls did not differ significantly concerning myofacial pain ( $P = 0.131$ ), disk displacement ( $P = 0.516$ ) and depression ( $P=0.34$ ). There was a significant difference between both groups concerning arthralgia, osteoarthritis and osteoarthritis ( $P = 0.003$ ) and pain with low disability ( $P = 0.022$ ).

UCH patients that underwent a condylectomy because of progressive mandibular asymmetry, developed more joint related temporomandibular problems as well as more post-operative pain when compared to age and gender matched individuals. However, these did not lead to higher disabilities in daily life.

