Acute Post-operative Pain can be Predicted by the Conditioned Pain Modulation (CPM) and Pain Catastrophizing Scale (PCS)

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AIM OF INVESTIGATION

• Incidence and severity of chronic post-operative pain may be predicted by conditioned pain modulation (CPM) examined before surgeries.1) It is however not known if CPM is predictive for the intensity of acute post-operative pain.
• The aim of the study was to investigate the relationship between pre-operative CPM effect and acute post-operative pain after orthognathic surgery.

METHODS

Subjects

• Forty-three patients scheduled for orthognathic surgery (13 men and 30 women, 24.0 ± 7.0 years, (median [interquartile range]) participated and had the CPM and PCS (Fig. 1) assessed prior to the study.

Pressure pain threshold: Test stimulus (TS) (Fig. 2)

• Pressure pain threshold (PPT) was measured as test stimulus (TS) using the electronic pressure algometer applied to the dominant forearm before and at the end of the conditioning stimulus (CS).

Cold-heat pulse stimulation: Conditioning stimulus (CS) (Figs. 2, 3)

• Tonic cold-heat pulse stimulation (pulse duration of 40 seconds, min. to max. temp: -10 to 47 °C) was applied to the contralateral forearm by the thermal stimulator with pain intensity of 70 on a visual analogue scale (VAS 0-100) as CS.

CPM evaluation (Fig. 2)

• The application of CS was started 2 min before TS measurement until CPM evaluation (Fig. 2).

CPM effect was defined as {(PPT during CS)/(PPT at baseline)-1} x 100%

Analyses

• The relationships between CPM effect, PCS, and VASAUC were analyzed using multiple regression analysis.

RESULTS

• Cold-heat pulse stimulation consisted of -2.0 [-10.0 - 4.0] °C for cold stimulus and 47.0 [47.0 - 47.0] °C for heat stimulus (median [interquartile range]).
• Positive CPM effect (≥ 0 %) was detected in 36 patients and negative CPM effect (< 0 %) was detected in 7 subjects (Table 2).
• VASAUC was 188.0 [96.6-286.1] (mm x day) (Table 4). In the patients with positive CPM effect, multiple regression analysis showed (Fig. 5): 1) VASAUC = (-4.11 x CPM effect) + (6.90 x PCS-total) + 161.77 (R=0.57, p=0.0005, CPM effect; p=0.008, PCS-total; p=0.002) 2) VASAUC = (-4.21 x CPM effect) + (10.76 x PCS-rumination) + 188.33 (R=0.46, p=0.0008, CPM effect; p=0.012, PCS-rumination; p=0.036) 3) VASAUC = (-3.18 x PCS-magnification) + (29.02 x PCS-magnification) + 182.78 (R=0.61, p=0.0002, CPM effect; p=0.032, PCS-magnification; p=0.001) 4) VASAUC = (-4.39 x PCS-magnification) + (16.70 x PCS-helplessness) + 209.30 (R=0.56, p=0.0008, CPM effect; p=0.005, PCS-helplessness; p=0.003)

CONCLUSIONS

• Acute post-operative pain of orthognathic surgery can be predicted by the pre-operative evaluation of CPM and PCS.
• Evaluation of CPM and PCS-magnification would be the most predictive biomarker for acute post-operative pain of orthognathic surgery.

REFERENCES