Single Joint Tissue Destruction Biomarkers: Association Between Type III Collagen Degradation and Local Tissue Damage of a Single Joint

#163

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BACKGROUND

The landscape of osteoarthritis (OA) research and therapeutic development has undergone significant transformation, shifting from a primarily structural focus to an emphasis on patient-reported outcomes (PROs). Pain, which primarily originates from the soft tissue of the joint, is intricately linked with the structural integrity of joint tissues. Serological biomarkers are considered potential surrogate endpoints, but their contribution from single joints to systemic levels in OA patients is unclear.

Aim of the study

This study explored systemic biomarker levels' response to tissue damage and healing in patients undergoing knee or hip joint replacement revision for aseptic failure, compared to patients with chronic pain from a joint replacement, but not receiving surgery.

METHODS

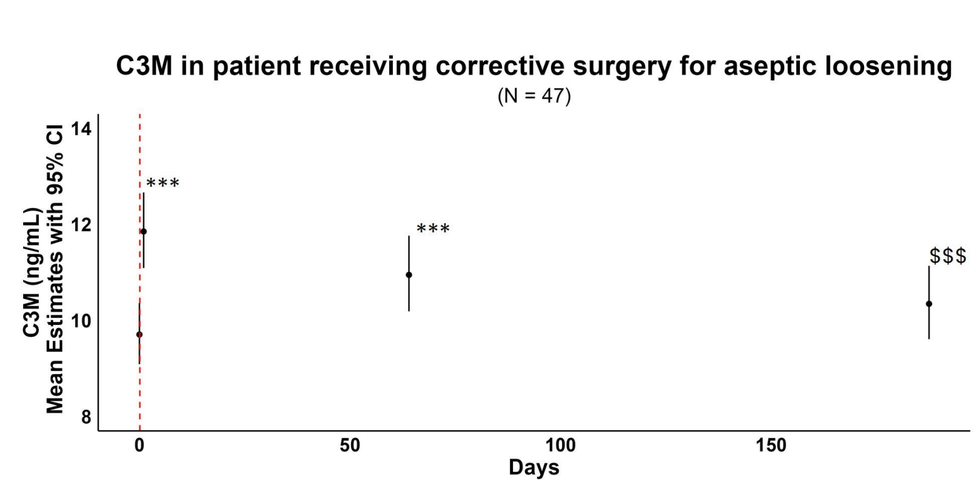
Study participants
The study included 66 patients referred with pain and complication from a prosthetic joint. Patients received corrective surgery for either aseptic failure (n=47) or a non-interventional observation period (n=18) and were followed for up to 6 months. Blood was drawn before revision (BL), 1-3 days after surgery (V2) and after median 6 months

C3M Biomarker
Type III collagen is a major constituent of the interstitial membrane and importantly the synovial membrane and turnover is upregulated during inflammation, healing and repair, including synovitis
C3M was measured at baseline and at least one follow-up visit, using ELISA.

Statistics
Longitudinal biomarker levels were modeled using linear mixed models and average levels compared within groups by 1-Way ANOVA and between groups at baseline by Mann-Whitney U-Test.

RESULTS

Longitudinal biomarker levels in patients with revision surgery vs observation period following total knee or hip replacement complication



Statistics: Linear mixed model, fixed: Visit; Random effects: Intercept and slopes of Visit by patient; p<0.05 ; ** p<0.01; *** p<0.001 (BL vs V2, V3, V4); $ p<0.05 ; $$ p<0.01; $$$ p<0.001 (V2 vs. V3, V4)

Demographics

	Aseptic failure (*n* = 47)	Chronic pain (*n* = 18)
Age (years) Median (Q1, Q3)	72.0 (67.0, 79.0)	68.0 (64.0, 77.0)
Sex Female	23 (47.9%)	9 (52.9%)
BMI (kg/m²) Median (Q1, Q3)	28.9 (26.8, 32.9)	28.8 (26.6, 33.7)
Joint Hip Knee	24 (50.0%) 24 (50.0%)	9 (52.9%) 8 (47.1%)
Intervention Surgery for aseptic failure None	47 (97.0%) 0 (0.0%)	0 (0.0%) 18 (100.0%)
Redness	0 (0.0%)	1 (5.6%)
Warmth	0 (0.0%)	0 (0.0%)
Swelling	10 (20.8%)	4 (22.2%)
Pain	47 (97.9%)	18 (100.0%)
Fever	0 (0.0%)	1 (0.0%)

Findings

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No Baseline Differences in C3M between aseptic loosening and chronic pain patients

Post-Surgery Changes revision surgery triggered a rapid increase in degradation biomarkers, which returned to normal within 2-3 months

Stable Levels in Chronic Pain Chronic pain patients showed no changes in biomarker levels over three months

Context of Findings

Weight loss is associated with reduction in C3M levels (*poster #728 and Loeser et al OAC; 25(11): 1822–1828. 2017*)

Reduced levels of C3M have been associated with improvement in WOMAC function (*Loeser et al OAC; 25(11): 1822–1828. 2017*)

CONCLUSION

C3M degradation was found to increase in response to tissue insult to the joint from revision surgery, while no change was observed in a non-surgical group with chronic pain of the joint over 6 months.

The increase and gradual decrease throughout the study period indicate a relationship between systemic levels of type III collagen degradation fragments and soft-tissue destruction and inflammation of the joint

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