

Thromboelastography-Derived Coagulation Profile of the Musculoskeletal Oncology Patient

Early Findings of a 20-Patient Pilot Study

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Background

Thromboelastography (TEG) is a point-of-care test that measures the elasticity and strength of a clot formed from a patient's blood. It provides a more comprehensive analysis of a patient's coagulation status than conventional measures of coagulation, such as the international normalized ratio (INR).

Musculoskeletal oncology patients pose a special challenge to surgeons in terms of management of coagulation. While hypercoagulability of malignancy places the cohort as a whole at increased risk of thromboembolic complications, patients undergoing large resections and reconstructive procedures are at risk for high-volume blood loss. Better identification of patients at risk for sequelae of both hyper- and hypocoagulability is of considerable value in this population.

Purpose

We sought to collect and analyze preoperative TEG data in order to establish a coagulation profile of musculoskeletal oncology patients.

Patients and Methods

We prospectively collected preoperative TEG assays on 20 consecutive patients with either primary bone or soft-tissue sarcoma or metastatic disease to bone, who were scheduled to undergo either tumor resection or nail stabilization. Conventional coagulation tests were also drawn.

Results

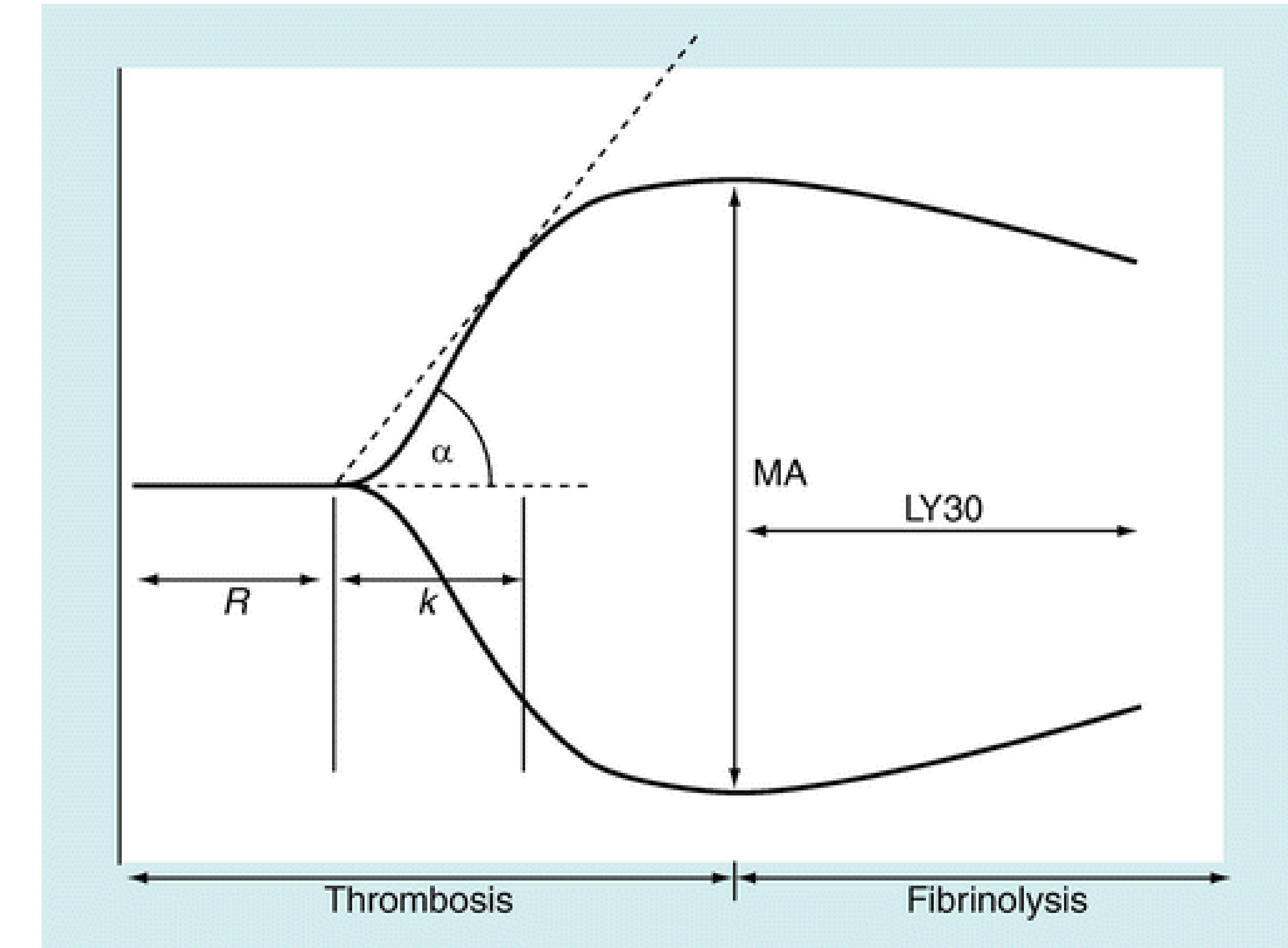
7/20 patients (35%) were female, with a mean age of 57.8 years at the time of surgery (SD = 20.0). 8/20 (40%) patients had metastatic disease. 18/20 (90%) underwent wide or intralesional resection, and 2 underwent nail stabilization. 10/20 (50%) had pelvic disease, 4 had lower extremity disease, and 6 had chest or upper extremity disease.

13/20 (65%) patients had an abnormal preoperative TEG. All of these 13 patients demonstrated TEG markers of hypercoagulability. The most frequent aberration was a reduced K-Value (11 patients), followed by reduced R-Time (5 patients) and increased MA (4 patients). Only 5/20 (25%) of our patients had an abnormal preoperative INR.

While the mean values of R-Time, K-Value, MA, and LY30 for our study population as a whole were within their respective normal ranges (Table 1), both R-Time and K-Value were at the lower range of normal.

TEG Marker (Normal Range)	R-Time (4.0-9.0)	K-Value (1.0-3.0)	MA (52.0-75.0)	LY30 (0-10%)
Sample Mean (SD)	4.4 (0.8)	1.1 (0.3)	69.2 (6.9)	1.4 (1.3)

Table 1



Sample Thromboelastogram

Conclusion

Based on our early results, a majority of musculoskeletal oncology patients are hypercoagulable at baseline. TEG detected hypercoagulability at a higher rate than conventional testing.

These findings warrant further investigation, with a larger—perhaps multi-institutional—cohort, with post-operative follow-up to assess the validity of TEG with objective clinical measures, such as occurrence of DVT/VTE, intraoperative blood loss, hematoma formation, and requirement for blood product transfusion.