

The Importance of Joint Ultrasound to Improve Adherence to Treatment in Children and Adolescents with Hemophilia



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OBJECTIVES

Primary or secondary prophylaxis with FVIII or FIX concentrates is the first therapeutic option for preventing hemophilic arthropathy in patients affected by hemophilia A or B¹. In the literature, it is well established that joint damage occurs before symptomatic hemarthrosis, and subclinical detection of joint modifications could lead to therapeutic changes (i.e. improvement in prophylactic regimens or switch from an on-demand regimen to prophylaxis). In particular, joint ultrasound (US) examination is a low-cost, readily available, operator-dependent technique and may be helpful in detecting subclinical damage in evaluating the efficacy of treatment regimen and improving adherence to therapy². Seriated joint US examination could also be used for monitoring the effectiveness of therapeutic changes.

METHODS

We carried out US evaluation of the knee, elbow and ankle joints with a Mylab2525 Gold (ESAOTE, Genoa, Italy) instrument (picture 1) in 20 people with hemophilia aged under fourteen, 18 with hemophilia A (13 severe; 5 moderate) and 2 with moderate hemophilia B, all without a history of inhibitor, viral infection due to HCV, HBV or HIV or joint pathology other than hemophilic arthropathy. Seventeen patients were on prophylaxis (15 on standard regimen) and 3 on-demand. The severity of joint damage was assessed by US score (table 1), with a value of which ≥ 5 (the worst value in joints evaluated) used as a cut-off for joint damage³ and as a decision-making tool to change therapeutic regimen. In patients undergoing a therapeutic change, US joint examination was repeated after six months to evaluate whether there was any improvement in US score.

Graphs and tables

US score (points)

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Effusion: Hydrarthrosis Hemarthrosis	Absent 0; small 1; moderate 2; large 3
Fibrotic septa	Absent 0; present 1
Synovial hypertrophy with flags on PDUS (power Doppler ultra-sonography)	Fewer than 3 flags 1; more than 3 flags 2
Synovial hypertrophy without flags on PDUS, thickness measured in mm	Less than 1.5 mm 1; 1.5-2.5 mm 2; more than 2.5 mm 3
Hemosiderin deposition (diffuse hyperechoic signal)	Absent 0; small 1; moderate 2; severe 3
Bone erosion (cortical break with an irregular shape)	Absent 0; present 1
Osteophytes (marginal hypertrophic bone formation)	Absent 0; present 1
Cartilage modifications	Hyperechogenicity 1; irregular profile 2; calcification 3
Bone remodeling (irregularity and incongruence joint surfaces)	Absent 0; present 1

Table 1: US score for evaluation of hemophilic arthropathy is shown³

Age	Hemophilia	Current treatment	Time zero US Score	Therapeutic changes	Six-months US Score
1	4	A severe	Modified prophylaxis (20 U/kg bw once a week)	50 U/kg twice a week	3
2	13	A severe	Prophylaxis (20 U/kg three times a week)	40 U/kg three times a week	5
3	10	A moderate	On-demand (30 U/kg)	30 U/kg three times a week	5
4	14	B moderate	On-demand (30 U/kg)	20 U/kg twice a week	3
5	5	A severe	On-demand (25 U/kg)	50 U/kg twice a week	4

Table 2: US score at time zero and six months



Picture 1: Mylab2525 Gold (ESAOTE, Genoa, Italy), instrument used for joints evaluation.

RESULTS

A total of 150 joint US scans were performed (120 at time zero and 30 after six months). Average US score at time zero was: 1.9 ± 2.4 . In 5 children (3 on prophylaxis, 2 on-demand) US results led to modifying the existing treatment regimen (as shown in table 2). As expected, a statistically significant difference in joint damage severity was found in patients receiving on-demand or modified scheme prophylaxis (4/5) compared to patients receiving standard prophylaxis (1/15) $p = 0.007$ (OR 8.12 95% CI 1.83 - 86.8). US examination at six months showed statistically improved state of joints in all 5 patients, with an average US score at time zero of 5.8 ± 0.84 points versus an average US score of 4 ± 1 points ($p = 0.016$) at six months. In particular, an improvement in synovial hypertrophy was detected at six-month examination and no sign of intraarticular activity (expressed as Power-Doppler signal) or joint effusion was found in any of the patients.

CONCLUSIONS

In experienced hands, joint ultrasound could become an indispensable tool to evaluate efficacy of therapeutic strategy and improve adherence to treatment in patients with hemophilia. It could also be a useful instrument when used in patient follow-up.

REFERENCES:

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