Evaluating the use of heparin derivatives in overweight and obese pediatric patients: a review
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BACKGROUND

• According to the CDC, one in five minors in the United States are described as obese.1
• Obese children are at higher risk of a hypercoagulable event, such as venous thromboembolism, compared to healthy weight children.2
• Concerns exist with the narrow therapeutic window of anticoagulants in general, and especially with children.3
• The use of low molecular weight heparins (LMWHs) in anticoagulation prophylaxis in overweight and obese children has been sparsely studied.

OBJECTIVES

• Evaluate and describe current available literature on the use of heparin derivatives in overweight and obese pediatric patients
• Assess efficacy and safety parameters of heparin derivatives in overweight and obese pediatric patients

METHODS

• A comprehensive literature search of PubMed, SCOPUS, Cumulative Index of Nursing and Allied Health, Academic Search Complete, PsycInfo, Cochrane Library, and Web of Science databases was conducted.
• Search terms used were “LMWH OR low molecular weight heparin OR enoxaparin OR dalteparin OR tinzaparin OR fondaparinux,” AND “pediatric OR child OR children,” AND “obese OR obesity OR overweight.”
• No limits or timeline restrictions were imposed.
• Studies were included if they contained pediatric patients who were overweight or obese and received either enoxaparin, dalteparin, tinzaparin, or fondaparinux.
• Exclusion criteria: Duplicate studies; off-topic studies; adult studies; inaccessible full articles; non-English studies; animal trials.

RESULTS

• Enoxaparin was the most studied heparin derivative in obese pediatric patients.
• Evidence for dalteparin and fondaparinux were limited; no studies using tinzaparin in this population were retrieved.
• Enoxaparin dose reductions of 13% to 37% occurred from baseline within the treatment studies.
• Prophylactic dose increases of enoxaparin from baseline ranged from 0% to 27.3%.
• Monitoring of anti-factor Xa measurements was inconsistently performed or reported by investigators.
• Fourteen minor bleeding events were reported in the literature along with one major bleeding event.
• Three thrombus extensions and two new thrombotic formations were described.

DISCUSSION

• The observed decrease seen from the enoxaparin treatment studies suggests that obese pediatric patients may be receiving supratherapeutic dosing initially.
• Prophylactic doses of enoxaparin were unchanged in two of three studies regardless of monitoring due to study protocol.
• Minor bleeding events were the most commonly reported safety parameter, with only one incidence of a major bleed inferred in the literature.
• The observed lack of monitoring is concerning due to the narrow therapeutic window of these agents, potentially placing patients at greater risk for safety concerns.
• Presently, there is no sub-stratification of obesity in pediatric patients, which could have a dramatic influence on future dosing of heparin derivatives.

CONCLUSIONS

• Enoxaparin is the most frequently described anticoagulant in the obese pediatric literature.
• Monitoring should be performed using anti-factor Xa measurements, although controversy does exist with the use of these measurements.
• Larger, long-term randomized controlled trials are needed to determine optimized treatment strategies on the heparin derivatives for better clinical outcomes in the overweight or obese pediatric population.

REFERENCES

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