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Case Study: 1-Year-Old Patient With Catheter-Related Thrombosis—How Do You Manage and for How Long?

Announcer:
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Dr. Goldenberg:
Hello. My name is Neil Goldenberg. I'm a professor in the departments of pediatrics and medicine at Johns Hopkins University School of Medicine and serve as the director of the thrombosis program and associate dean for research at Johns Hopkins All Children's Hospital in St. Petersburg, Florida. This presentation is on reducing the risk of recurrent venous thromboembolism in children. A one-year-old with catheter-related deep vein thrombosis.

The case is that of a one-year-old child hospitalized for severe dehydration. He had a four-day history of progressively decreased appetite, increased wet diaper frequency, and increased irritability. He became listless on the day of admission and the parents called 911. The paramedics placed an intraosseous catheter in the left lower extremity en route to the children's hospital. A normal saline bolus was given times two in the ambulance and IV fluids were started. At the children's hospital emergency department, a complete metabolic profile revealed marked hyperglycemia and acidosis. Serum beta-hydroxybutyrate levels were elevated and the child was diagnosed with diabetic ketoacidosis. Insulin was started and he was admitted to the pediatric intensive care unit for further glycemic control and fluid and electrolyte management.

In the PICU, a femoral central venous catheter was placed in the right lower extremity. 12 hours later, the bedside nurse noticed his right lower extremity swelling. A compression ultrasound with Doppler was performed and reveals non-occlusive DVT of the mid and proximal portions of the right femoral vein, extending to the distal portion of the common femoral vein. How do we manage this case of DVT? We need to consider acute anticoagulant therapy. In other words, acute secondary VTE prevention. Subacute anticoagulant therapy. In other words, subacute secondary VTE prevention. And any future needs for anticoagulation, including episodic secondary VTE prevention.

In terms of acute anticoagulation therapy for the first five to seven days post-diagnosis, the mainstay of care is low molecular weight heparin given subcutaneously every 12 hours, with age and weight-based starting dose adjusted to achieve an anti-Xa activity level of 0.5 to 1.0 anti-Xa units per mL at four hours post-dose. In the setting of moderate to severe renal insufficiency, every 24-hour initial dosing is frequently employed with further adjustment based on peak and trough values of anti-Xa.

With regard to subacute anticoagulant therapy, this begins at five to seven days post-diagnosis and extends through 6 to 12 weeks post-diagnosis. We have two major options. One is to continue low molecular weight heparin subcutaneously every 12 hours and recheck an anti-Xa level in the circumstance that weight changes by 10% or there is a change in renal function, or we can transition to a direct oral anticoagulant. With direct oral anticoagulant, or DOAC, no lab monitoring is required, but we should observe clinically for any signs of bleeding. For example, in a one-year-old weighing 8.5 kilograms, our options include dabigatran pellets, 70 milligrams orally every 12 hours, which is the dosing for patients seven to nine kilos of weight and 9 to 24 months old. Or we can use rivaroxaban suspension, 2.4

milligrams orally every eight hours, which is the dosing for children 8 to 8.9 kilograms in weight. How long to treat?

A Kids-DOTT randomized control trial, published in "JAMA" in January 2022, indicates that a six-week duration of therapy is appropriate with the assumptions, in this case, that the CVC has been removed, new-onset type one diabetes mellitus is well controlled, and repeat imaging at six weeks demonstrates blood flow. What about the future needs for anticoagulant therapy after completion of the treatment course? We should consider episodic secondary VTE prevention. In other words, episodic secondary anticoagulation during future scenarios of heightened venous thromboembolism risk. This may include future episodes of DKA in this child or future episodes of CVC placement. Here again, we have a few options. One is to use low molecular weight heparin, 0.5 milligrams per kilogram subcutaneously every 12 hours, or to use a DOAC. For example, we can use dabigatran pellets at weight and age-based dosing, either using the previous treatment doses or half of the age and weight appropriate treatment doses. Alternatively, we can use rivaroxaban suspension at weight based dosing, using either the previous treatment dosing based on weight or a half of treatment dose approach. Thank you for your attention.

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