

Liposomal Bupivacaine for Postoperative Pain Control after Abdominal Surgery

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BACKGROUND

Liposomal bupivacaine (Exparel®) is a local anesthetic formulation which is FDA approved for use in adult patients for surgical site infiltration for postoperative pain control. At our institution, the use of transversus abdominus plane (TAP) catheters for adults has been replaced by single-shot injections of Exparel® mixed with bupivacaine 0.25%. The medication has not been well studied for use in the pediatric population, and we present a case of successful postoperative pain control in a pediatric patient undergoing abdominal surgery.

CASE REPORT

A 12-year-old, 45 kg previously healthy male presented to the ED with right upper quadrant abdominal pain which began one month after blunt trauma. Workup revealed a right hepatic mass, presumed to be an infected hematoma. The patient presented for right hepatic wedge resection with plan for general anesthesia and a multimodal approach for pain control. Due to the unilateral incision, ipsilateral TAP and rectus sheath blocks were chosen over an epidural catheter placement. After induction and intubation, the blocks were performed using a mixture of Exparel® 1.3% 20 mL and bupivacaine 0.25% 20 mL (30mL for the TAP block and 10 mL for the rectus sheath block). Intraoperative analgesics included fentanyl (150 mcg), ketamine (15 mg), ketorolac (30 mg), and hydromorphone (0.4 mg). In the recovery room, he reported a pain score of 4/10 and refused any intervention. His postoperative day one and two pain was described as “sore” and ranged from 2-5/10 in severity, with an isolated score of eight.

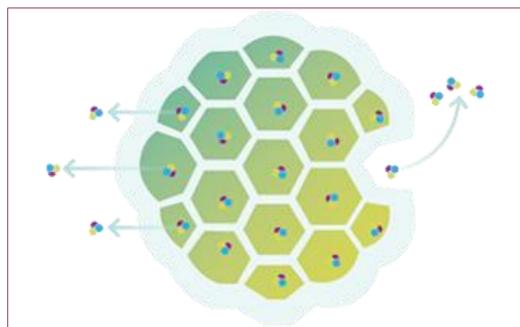


Figure 1: Cross-sectional diagram of DepoFoam multivesicular liposome containing bupivacaine. Image supplied courtesy of Exparel.com

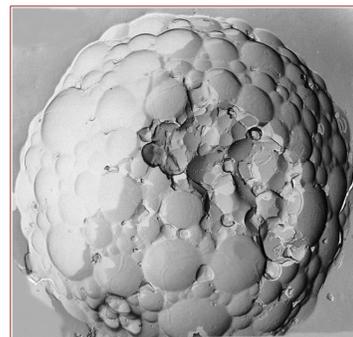


Figure 2: Scanning electron microscope image of DepoFoam® containing bupivacaine. Image supplied courtesy of Pacira Pharmaceuticals, Inc, 5 Sylvan Way, Parsippany, NJ 07054.

DISCUSSION

Exparel® is a multivesicular liposomal bupivacaine formulated to allow extended release of the drug, prolonging duration of action and limiting peak plasma concentrations (Figure 1 & 2). It was approved in 2011 by the US Food and Drug Administration for wound infiltration and in 2015 for “local surgical infiltration” and TAP blocks. There have been multiple published reports regarding its off-label use for peripheral nerve blocks in adults, and at our institution Exparel® has been adopted as the preferred local anesthetic for TAP blocks. In this use, it provides an alternative to indwelling catheters for postoperative pain control. For this case, liposomal bupivacaine was chosen in a pediatric patient for its prolonged duration of action, the need for a unilateral block, and the ease of performing the technique. Liposomal bupivacaine has not been studied or approved in the pediatric population, and the manufacturer indicates that post-market studies would be helpful in this population. One particular area of concern would be weight-based dosing, which has not yet been determined for adults, likely due to its slow delivery mechanism. In this case, we report on the successful use of Exparel® for postoperative pain control in a 12-year-old patient. Research is needed to determine safe dosing of this medication in pediatric patients.

Lessons Learned

- Multivesicular liposomal bupivacaine allows extended release of drug, which limits the peak plasma concentration, potentially improving its safety profile.
- Duration of action of Exparel® has been reported to be three days, potentially replacing the need of neuraxial and peripheral nerve catheter infusions.
- More research into its dosing and adverse effect profile in the pediatric population is needed.

REFERENCES

1. Malik O, Kaye A, et al. Emerging roles of liposomal bupivacaine in anesthesia practice. *J Anaesthesiol Clin Pharmacol*. 2017 Apr-Jun;33(2): 151-156.
2. Chahar P, Cummings KC. Liposomal bupivacaine: a review of a new bupivacaine formulation. *Journal of Pain Research*. 2012;5:257-264. doi:10.2147/JPR.S27894.