Rectal Delivery of Magnesium Sulfate

Simplifying anticonvulsant therapy for severe preeclampsia/eclampsia

PROBLEM

Preeclampsia/Eclampsia

- Preeclampsia/eclampsia (PE/E) account for at least 16% of maternal deaths in low-resource settings.
- The risk that a woman in a developing country will die of PE/E is approximately 300 times greater than that for a woman in a developed country.
- WHO has identified magnesium sulfate ($MgSO_4$) as the most effective, low-cost anticonvulsant for the treatment of severe PE/E.

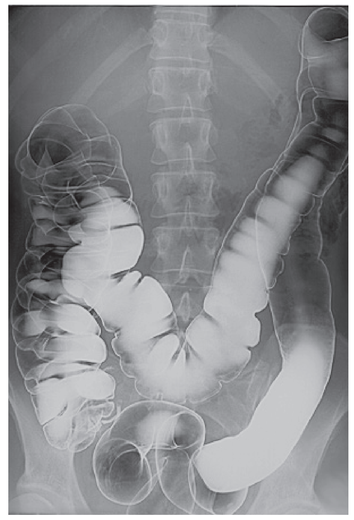
PATH/Mike Wang

Barriers to Use of $MgSO_4$

- Current regimen requires complicated dilution and delivery techniques.
- Large, deep muscle, intramuscular injection results in discomfort for the woman.
- Manual administration of an intravenous $MgSO_4$ loading dose is difficult.
- Health providers are concerned about the risk of magnesium toxicity.
- Parenteral delivery requires a health care worker trained and authorized to administer injections.

RECTALLY DELIVERED MUCOADHESIVE GEL CONTAINING $MGSO_4$

- PATH will develop a $MgSO_4$-containing gel delivered as a retention enema.
- The gel would provide stable therapeutic serum magnesium levels from uptake at the lower gastrointestinal tract.
- There is supportive evidence for the quick and sustained uptake of magnesium after the rectal delivery of magnesium sulfate.



PROPOSED RESEARCH UNDER SLAB

1. Formulation and in-vitro qualification of an $MgSO_4$ gel presentation for rectal delivery.
2. Preclinical trials to assess the pharmacokinetics and toxicity for this novel $MgSO_4$ delivery method.
3. Consultations with experts in Western Kenya to determine potential barriers and assess feasibility.

PATH

ADVANTAGES OF RECTAL DELIVERY OF $MgSO_4$

- The rectal route of administration is an established delivery route for many pharmaceutical products.
- Ease of use and access to anticonvulsant therapy for women with severe PE/E would be increased.
- A rectally delivered gel can be easily reapplied and removed at end of care.
- Formulation with mucoadhesives and thermo-reversible gelling agents can produce well-retained gel, resulting in the consistent sustained uptake of $MgSO_4$.
- Can be administered in the community by health workers not authorized to administer injections.
- Raw materials and delivery devices are inexpensive and readily available on the global market.
- Provides a simple, effective, and safe alternative to current delivery regimens.

PATH/Patrick McKern

July 2013

PATH
A catalyst for global health