

Bladder Function Following Prenatal Closure

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Pediatric Urology Fall Congress
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Agenda



Critical look at MOMS and post-MOMS series



Unpublished data



Where we have areas to improve



What we need

MOMS

- NIH funded
- 2003 to 2017
- Pros:
 - Randomized
 - Adequately powered for primary outcomes
 - Multi-center (3)

MOMS

- Cons
 - No pre-established urologic outcomes
 - Secondarily funded sub-study 2005—2010
 - Timing of testing standardized
 - US and UDS at 12 and 30 months
 - **UDS technique not standardized**
 - **Clinical management (CIC, meds) determined by treating urologist**

Bladder Function After Fetal Surgery for Myelomeningocele

John W. Brock, III, MD^a, Michael C. Carr, MD^{b,c}, N. Scott Adzick, MD^d, Pamela K. Burrows, MS^e, John C. Thomas, MD^a, Elizabeth A. Thom, PhD^e, Lori J. Howell, RN, MS^d, Jody A. Farrell, RN, MS^f, Mary E. Dabrowiak, MSN, WHNP^g, Diana L. Farmer, MD^f, Earl Y. Cheng, MD^h, Bradley P. Kropp, MDⁱ, Anthony A. Caldamone, MD^j, Dorothy I. Bulas, MD^k, Susan Tolivaisa, BS^l, Laurence S. Baskin, MD^m, for the MOMS Investigators

- Death or need for CIC at 30 months
- 3 independent reviewers: “CIC” if criteria met
52% in prenatal, 66 % postnatal

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- Actually on CIC by 30 mo: 38% prenatal, 50% postnatal
- Of those who met criteria for CIC only 50% in prenatal group and 62% in postnatal group had CIC

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- Urodynamics: no evident difference
- Less trabeculation, less open bladder neck

UDS



MOMS School-age Outcomes

Brock JW III, Thomas JC, Baskin LS, Zderic SA, et al. Effect of prenatal repair of myelomeningocele on urologic outcomes at school age. J Urol 2019 Oct;202:1-7.

- ✓ No difference in bladder augmentation vs postnatal (6%)
- ✓ Mean 7.4 y: CIC 62% prenatal vs 87% postnatal ($p < 0.001$) **
- ✓ More parents report **volitional voiding** in prenatal cohort (24% vs 4%)
 - Confirmed by uroflow in some

MOMS School-age Outcomes

Brock JW III, Thomas JC, Baskin LS, Zderic SA, et al. Effect of prenatal repair of myelomeningocele on urologic outcomes at school age. J Urol 2019 Oct;202:1-7.

- Still impacted by variations
 - Threshold for initiation of CIC
 - Parent reported voiding
 - Parents acceptance of “neurogenic bladder” or “not normal”



If it isn't published, it didn't happen

- Who is doing what and how?

If it isn't published, it didn't happen

- Who is doing what and how?
- Different fetal techniques
- Different UDS
- Different interpretation / threshold for medical management

If it isn't published, it didn't happen

- Who is doing what and how?
- Different fetal techniques
- Different UDS
- Different interpretation/ threshold for medical management
- We may not be speaking the same language!

Categorization of Bladder Dynamics and Treatment after Fetal Myelomeningocele Repair: First 50 Cases Prospectively Assessed

Marcela Leal da Cruz,* Riberto Liguori, Gilmar Garrone, Bruno Leslie, Sérgio Leite Ottoni, Sérgio Carvalheiro, Antonio Fernandes Moron, Valdemar Ortiz and Antonio Macedo, Jr.

From the Departments of Urology (MLdC, RL, GG, BL, SLO, VO, AM), Neurosurgery (SC) and Department of Obstetrics-Fetal Medicine (AFM), Federal University of São Paulo and Santa Joana Maternity and Hospital (AFM), São Paulo, Brazil

J Urol 2015

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2011, post MOMS

First 50 patients

❖ 6% VPS rate

Categorization of Bladder Dynamics and Treatment after Fetal Myelomeningocele Repair: First 50 Cases Prospectively Assessed

ICCS technique, 1 urodynamicist

Normal: stable pressure, no leakage

High Risk: overactive with detrusor leak point pressure >40 (?CLPP) and filling pressure >40

Incontinent: overactive with leak <40 or leak point pressure <40

Underactive : underactive with +PVR

Categorization of Bladder Dynamics and Treatment after Fetal Myelomeningocele Repair: First 50 Cases Prospectively Assessed

ICCS technique, 1 urodynamicist

Normal: stable pressure, no leakage 4%

High Risk: overactive with detrusor leak point pressure >40 (?CLPP) and filling pressure >40



CIC and Antichol = **56%**

Incontinent: overactive with leak <40 or leak point pressure <40 **38%**

Underactive : underactive with +PVR CIC 2%

Urological Evaluation of Patients that Had Undergone in Utero Myelomeningocele Closure: A Prospective Assessment at First Presentation and Early Follow-Up. Do their Bladder Benefit from it?

Antonio Macedo Jr.,¹ Marcela Leal,¹ Atila Rondon,^{1*} Valdemar Ortiz,¹ Antonio Fernandes Moron,^{2,3} and Sérgio Cavalheiro⁴

¹*Department of Urology, Federal University of São Paulo, São Paulo, Brazil*

***In utero* myelomeningocele repair and urological outcomes: the first 100 cases of a prospective analysis. Is there an improvement in bladder function?**

Antonio Macedo Jr, Sergio Leite Ottoni, Gilmar Garrone, Riberto Liguori, Sergio Cavalheiro, Antonio Moron, Marcela Leal Da Cruz ✉

A comparative analysis of bladder pattern of patients that underwent *in utero* versus postnatal myelomeningocele repair. *Macedo J Urol in press 2019*

Initial CMG

- Group 1 (prenatal): n= 88 DO 76.8%; high risk 56%
- Group 2 (postnatal 1st seen after one year): n= 86 high risk 50 %
- Group 3 (postnatal 1st seen before one year) n=38 high risk 50%

Original Paper

Urinary and Fecal Continence in 5-Year-Old Patients Who Underwent in utero Myelomeningocele Repair: A Prospective Study

Macedo Jr. A.^{a,b} • Cavalleiro S.^{c,e} • Moron A.^{d,e} • Lobountchenko T.^a • Dini F.S.^a • Ottoni S.L.^a •
Garrone G.^a • Ligor R.^a • Leal da Cruz M.^a

- 14 patients > 5 years
- 71 % F
- 86% use CIC 79% in diaper

Original Paper

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Garrone G.^a • Ligor R.^a • Leal da Cruz ...

- 14 patients
- 71 %
- 86% use ... 79% in diaper

**PRENATAL CLOSURE DOES NOT IMPROVE
BLADDER OUTCOMES**

ORIGINAL CLINICAL ARTICLE

Prenatal myelomeningocele repair: Do bladders better?

Maya Horst✉, Luca Mazzone, Thomas Schraner, Christine Bodmer, Ueli Möhrle, Martin Meuli, Rita Gobet

First published: 15 November 2016 | <https://doi.org/10.1002/nau.23174> | Cited by: 5

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30 prenatal closures 2010-2015

8 pt with **2 years** followup vs. 8 consecutive postnatal closures

- 50% “normal” bladders in prenatal
- CIC 50% vs 100% of postnatal **

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DOES IMPROVE BLADDER OUTCOMES ?

Evaluating Bladder Function and Safety in Prenatal Fetoscopic Versus Prenatal Open Myelomeningocele Repair

Jonathan Gerber, MD, Paul F. Austin, MD, Alexandra N. Borden, PA-C, William E. Whitehead, MD, Jonathan Castillo, MD, Heidi Castillo, MD, Michael A. Belfort, MD, Duong D. Tu, MD.
Texas Children's Hospital, Houston, TX, USA.

- POMR (n=15) vs FMR (n=13)
- Inclusion: baseline CMG within 9 months and followup within 18 months.
- Initial UDS, 73% of POMR patients were **high risk**
 - **36% improve *without intervention***
- 54% of FMR patients were **high risk**
 - **43% improve *without intervention***
- At follow up, 40% of POMR high-risk vs 7.7% of FMR



Nearly 100 fetal closures



Significant revisions in technique over time



Observed increase clinical tethered cord compared to open cohort



Other outcomes?

Secondary Tethering and Urodynamic Findings after Prenatal Closure for Myelomeningocele

Duncan R. Morhardt, MD, PhD, Shahram Khoshbin, MD, Benjamin Warf, MD, Mohammad Alkhawaldeh, PhD, Caleb Nelson, MD, MPH, Carlos Estrada, Jr., MD, MBA, Stuart B. Bauer, MD.
Boston Childrens Hospital, Boston, MA, USA.

- 18 patients, fetal closure elsewhere
- 50% developed clinical tethered cord

This is not good for the bladder—are
some closures more at risk?

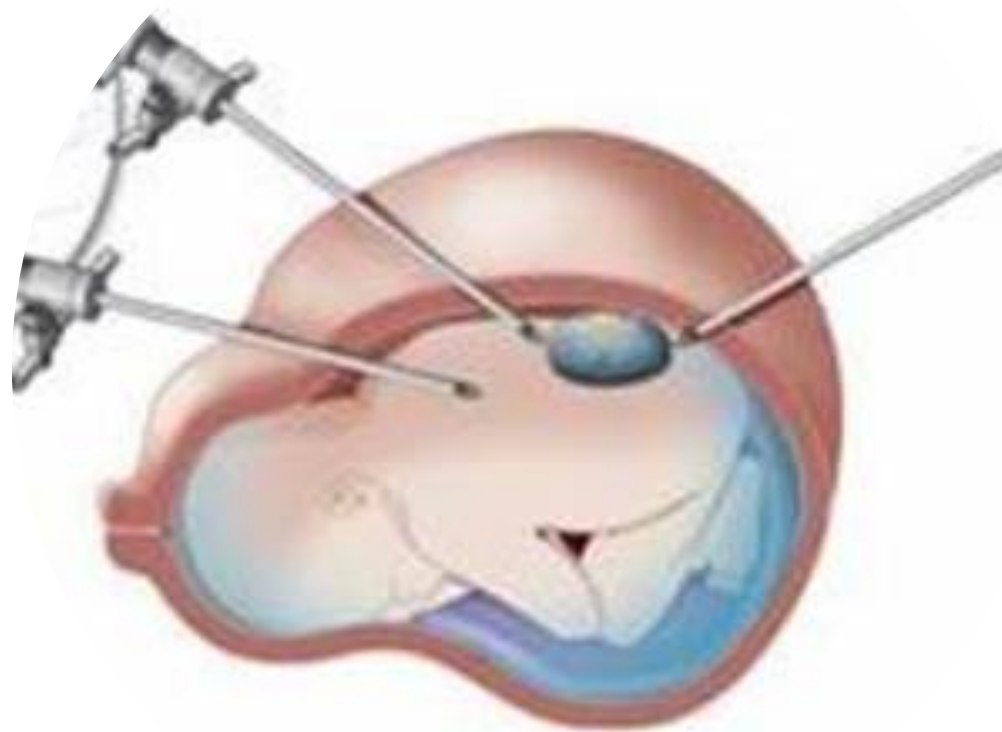
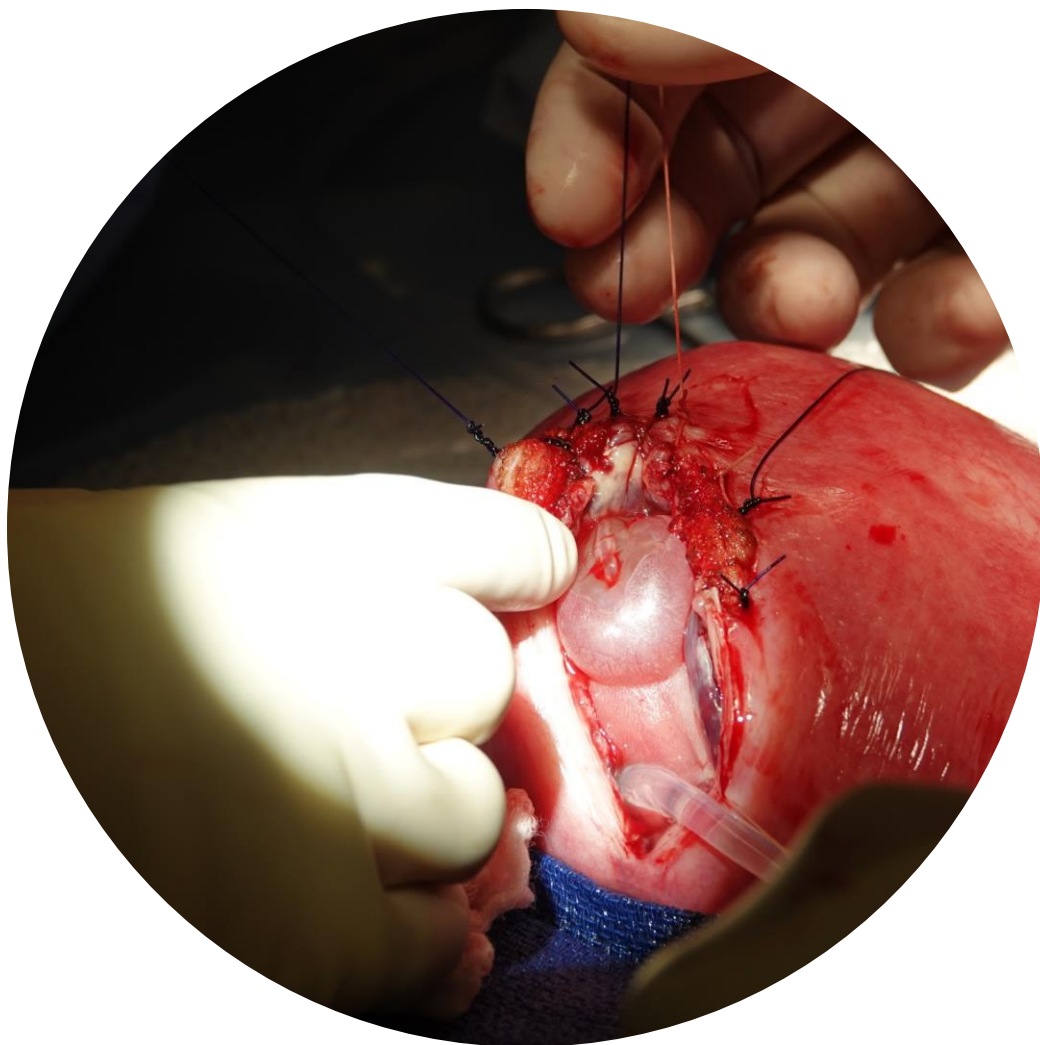


Single-center vs Multi-center?

- Urodynamics → management
- Consistent subjectivity vs compounded subjectivity?
- It will be difficult to understand what we are doing











Three Phase Counseling

- Phase 1: 2-3 hours about spina bifida
 - Group consultation: MFM, NICU, Ped Surg, NS, Fetal nursing, SW, Genetics
 - Includes expectation for long term followup and participation in MDC
- Phase 2: 1-2 hours, same team
 - Why to consider fetal repair, maternal risks, implications prematurity
- Phase 3: Same team + anesthesia
 - Anesthesia for mother and baby
 - What happens if intraoperative distress
 - Sign surgical consent

Phase 4? Transition of Care

- Who is going to be providing the urologic care?
- Have we prepared the family adequately?
- Have we made the connection?



Our good friend
urodynamics....it does
matter but there are
issues







HAPPY BIRTHDAY !!