New Advances in Biofeedback

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Content

- What is biofeedback
- Types of biofeedback
- Uses of biofeedback in UI
- Uses of Biofeedback in FI & Constipation

What is Biofeedback

- an instrument-based learning process; it uses equipment to record or amplify a patient's bodily activities and then provides feedback to the patient as visual, auditory, or verbal responses

The Use of Biofeedback

- As a part of motor re-learning in which a patient learns what is required and how to perform a task.

To define biofeedback

- Augmented feedback , concurrent or terminal feedback of biological signals that enables a person to identify and modify a bodily function of which they are usually unaware of

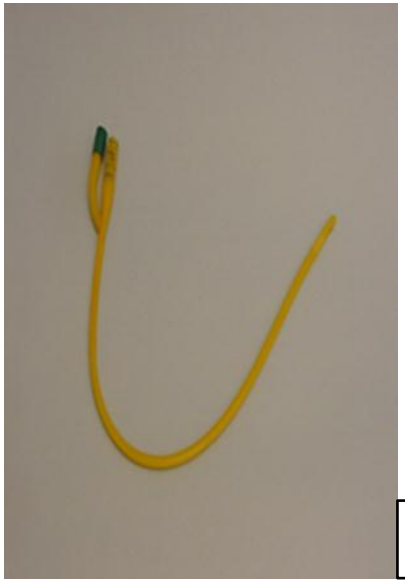
  Sandweiss 1985

- Often with the use of device to record the biological signals

Verbal Feedback

- provided by the therapist by complimenting the patient for performing a correct maneuver or rectifying any errors

Sensory Biofeedback



Intravaginal resistive device

Visual Biofeedback

Ultrasound

- Physiotherapists have been using for therapeutic

- Now progress to diagnostic particularly as a mean of biofeedback to both therapists and patients

Physiotherapy and diagnostic ultrasound as biofeedback

- looking for such things as changes in associated structures such as the bladder base, tissue deformation and movement
- assess muscle structure and behaviour and perform measurements of muscle thickness and bulk.
- Evaluate muscles and its function during exercise & physical tasks

Whittaker JL, Teyhen DS, Elliott JM, et al 2007

Physiotherapy and ultrasound

- to assist clients in ‘turning on’ specific muscle groups (visual biofeedback)

- Both diagnostic and feedback together

Real time ultrasound

- Direct visualisation of the PFM contraction (Thompson 2005)
- Biofeedback method to teach the correct technique of performing PFM exercises (McKiernan 2010)
- 'lifting' contraction: quantify the amount of movement of the bladder base during PFM contraction (Thompson 2007)
- Co-activation of the abdominal muscles during PFM contraction exists in continent and stress incontinent women (Arab & Chehrehrazi 2011)

Ultrasound imaging

- Transabdominal:

1. No bony landmark to measure the absolute values for PF displacement
2. All values are relative
3. Clinical comparisons must remain intra-patient rather than inter-patient

- Translabial (transperineal):

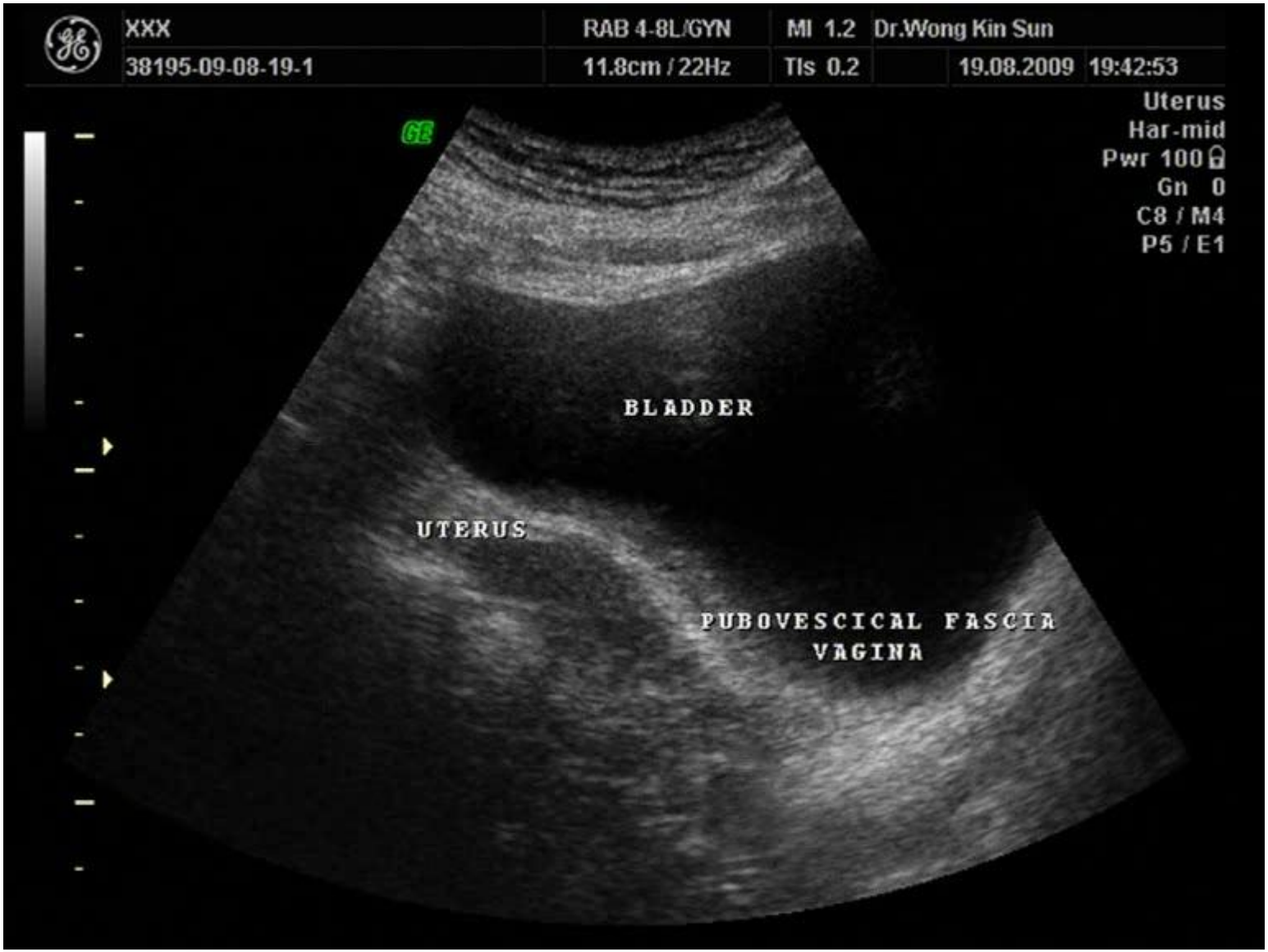
Different usage of the ultrasound

- This elevation lifts the urinary bladder, specifically the bladder base and neck, this elevation can be seen, assessed and measured using transperineal and transabdominal ultrasound.

- Information about the supporting function of the pelvic floor muscles during manoeuvres such as sneezing, coughing and valsalva can also be assessed by imaging the bladder

Whittaker JL, Thompson JA, Teyhen DS, Hodges P 2007

Supra-pubic ultrasound for biofeedback



Transabodominal ultrasound

Advantages of Ultraound Biofeedback

- Non-invasive
- Easily performed
- Gives quick biofeedback
- Convenient and easily understood Baessler K 2008
- Functional

A randomised controlled trial of transabdominal ultrasound biofeedback for pelvic floor muscle training in older women with urinary incontinence

Galea, Mary P; Tisseverasinghe, Santha; Sherburn, Margaret

Australian and New Zealand Continence Journal, The, ISSN 1448-0131, 2013, Volume 19, Issue 2, pp. 38 - 44

To investigate the effectiveness of transabdominal ultrasound as biofeedback for pelvic floor muscle training in older women with urinary incontinence, a randomised controlled trial was conducted in an outpatient setting in a tertiary hospital. In the trial 22 women aged >/=60 years, with symptoms of urinary incontinence, were assigned to 10 weeks of conventional physiotherapy using either vaginal palpation or ultrasound biofeedback and followed up at three months. There **were no significant differences between the groups on any outcome measures: 24-hour pad weight test; number of incontinence episodes per week; quality of life**. The **ultrasound group had a significant reduction in the number of incontinence episodes per week**. Visual feedback using transabdominal ultrasound imaging of the pelvic floor appears to be effective in teaching pelvic floor muscle contractions to older women with urinary incontinence. Further investigation of this technique is warranted.

Treatment of UI

- PFMT as the first line management
- To use biofeedback as an adjunct or not?

Does biofeedback adds further benefit to PFMT for women with Urinary Incontinence?

Cochrane Review 2011

Feedback or biofeedback to augment pelvic floor muscle training for urinary incontinence in women

Results

- 24 trials
- Women who received biofeedback were significantly more likely to report that their urinary incontinence was cured or improved compared to those with PFMT alone

However…..

- Common for women at the biofeedback arm to have more contact with health professionals than those with PFMT only
- A large variation in all exercise regime
- Therefore result not clear

Conclusion

- Further research is needed to differentiate whether it is the feedback or biofeedback that causes the beneficial effect or some other difference between the trial arms such as more contact time with health professionals

International Urogynecology Journal
August 2013, Volume 24, Issue 8, pp 1347-1354

Randomized controlled trial of pelvic floor muscle training with or without biofeedback for urinary incontinence

Tomoe Hirakawa, Shigeyuki Suzuki, Kumiko Kato, Momokazu Gotoh, Yoko Yoshikawa

Methods

Women with SUI were randomized to PFMT with BF (BF group, n = 23) or without BF (PFMT group, n = 23) for 12 weeks. As primary outcome measures, subjective symptoms and QOL were assessed by the King's Health Questionnaire (KHQ) and International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF). A voiding diary, 1-h pad test, and measurement of PFM strength were secondary outcome measures. Changes in the primary and secondary outcomes were assessed before and after 12 weeks' exercise training.

Results

Of the 9 domains of the KHQ, the scores of 5 significantly decreased in the PFMT group, and the scores of 7 significantly decreased in the BF group. All ICIQ-SF items and the total score significantly decreased in both groups after therapy. The number of incontinence episodes significantly decreased in the PFMT group, and tended to decrease in the BF group, but this was not significant (P = 0.054). The leakage volume in the 1-h pad test tended to decrease in both groups, but was not significant. Maximum vaginal squeeze pressure significantly increased in both groups. There were no significant inter-group differences in the changes in any of the parameters assessed.

Conclusions

The results indicate that PFMT is effective for treating SUI. There is no apparent add-on effect of BF training in short-term follow-up.

Finding suggested…..

- Women in the BF group with very low PFM strength tended to improve the maximum vaginal squeeze pressure more than the women in the PFMT group

Biofeedback Therapy in Faecal Incontinence and Constipation

- 1974, BFT in FI Engel BT, Nikoomanesh P, Schuster MM 1974

- 1987, BFT in constipation Bleijenberg G, Kuijpers HC 1987

Goal of BFT in Defecatory Disorder

- Strengthen the PFM
- Retrain rectal sensation
- Co-ordinate PFM during evacuation

Norton et al 2012

Rao 2011

Faecal Incontinence and Biofeedback

Cochrane Review in 2008

11 RCTs has concluded that there is **no evidence at present of one method of biofeedback giving any benefit over any other method,** or that exercises or biofeedback offer any advantage over the consecutive care.

Electrical stimulation and biofeedback for the treatment of fecal incontinence: a systematic review.

Vonthein R1, Heimerl T, Schwandner T, Ziegler A. 2013

- The higher the quality of the randomized trial the more likely was a significant difference between treatment groups.

- Two times more patients became continent when biofeedback was used instead of a control, such as pelvic floor exercises.

- Two times more patients became continent when biofeedback plus electrical stimulation was used instead of biofeedback only.

BFT and Faecal Incontinence

- rectal balloon training to enhance rectal discrimination of sensation may be helpful in reducing FI Bols E et al 2012

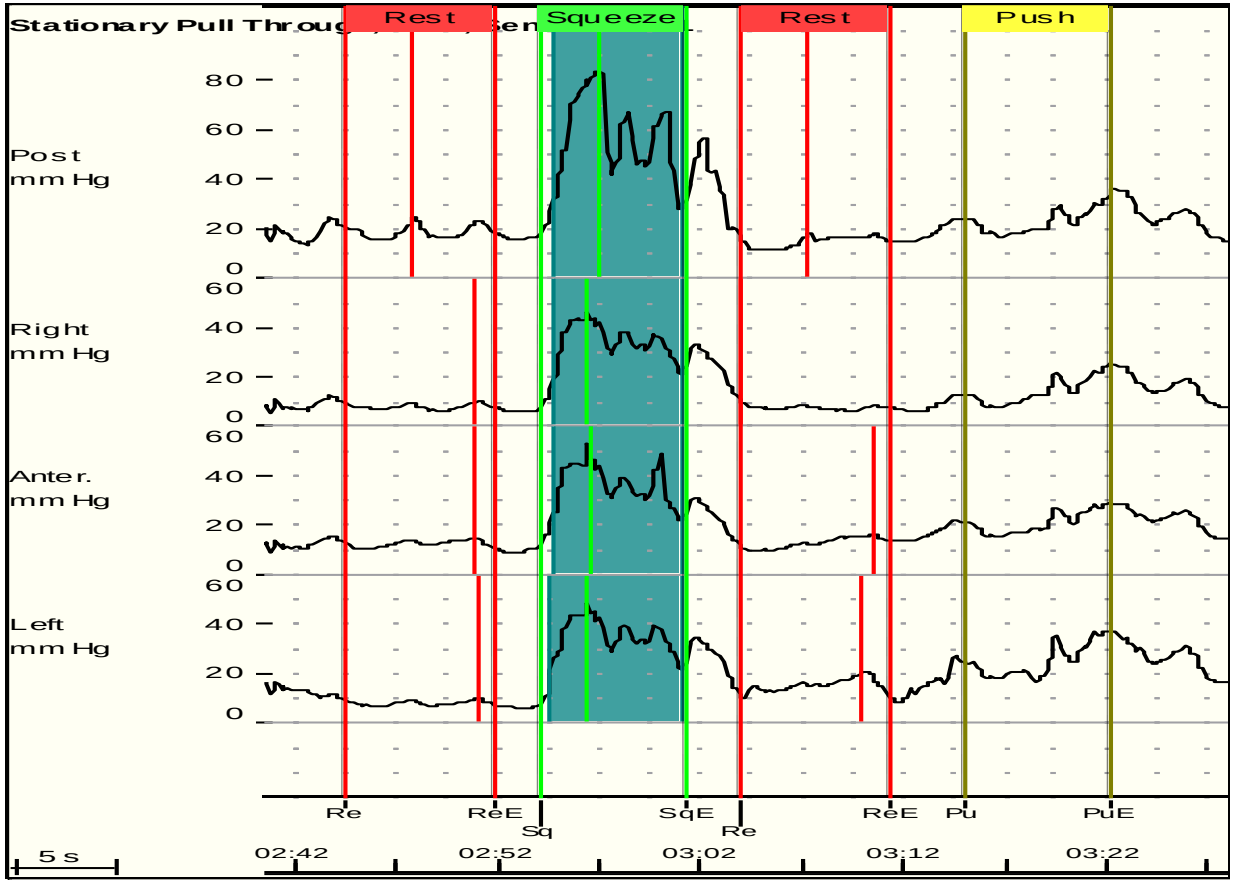
Biofeedback and Constipation

- Symptomatic improvement rate has varied between 44% and 100% in randomized controlled trials of adults with DD Rao 2011
- BFT is superior to controlled treatment approaches, such as diet, exercise, laxatives etc Rao 2007
- A meta-analysis revealed that BFT is more than three times as effective as non-BFT Enck et al 2009

BFT and Constipation

- improves global symptoms and normalizes colon transit time as well as the dyssynergic pattern of defecation and constipation symptoms Rao et al 2007 Rao et al 2011
- Long term effect up to 2 years
- The American Gastroenterological Association (AGA)and the Asian Neurogastroenterology and Motility Association guidelines strongly recommend BFT for the management of DD Bharucha AE et al 2013

Manometry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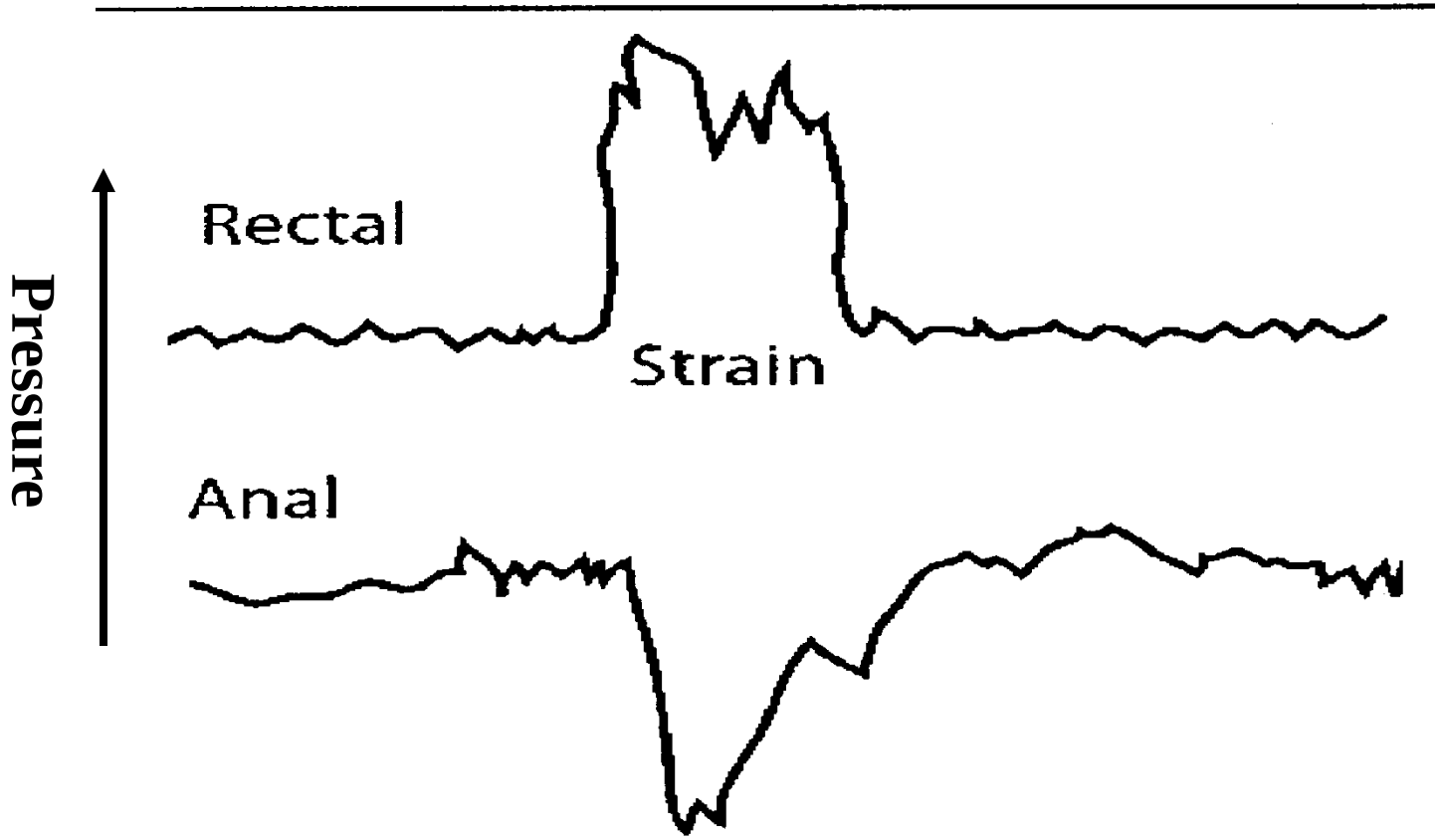
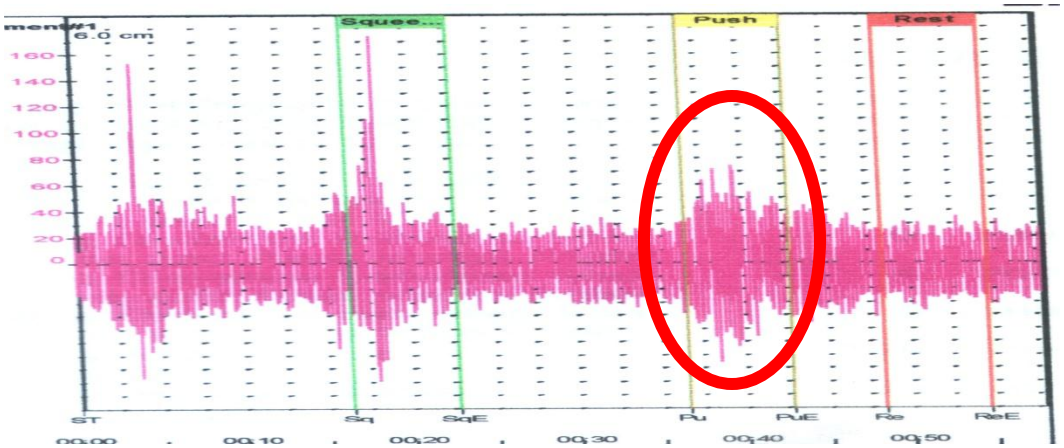
Normal co-ordinated response of the anorectum during attempted defaecation

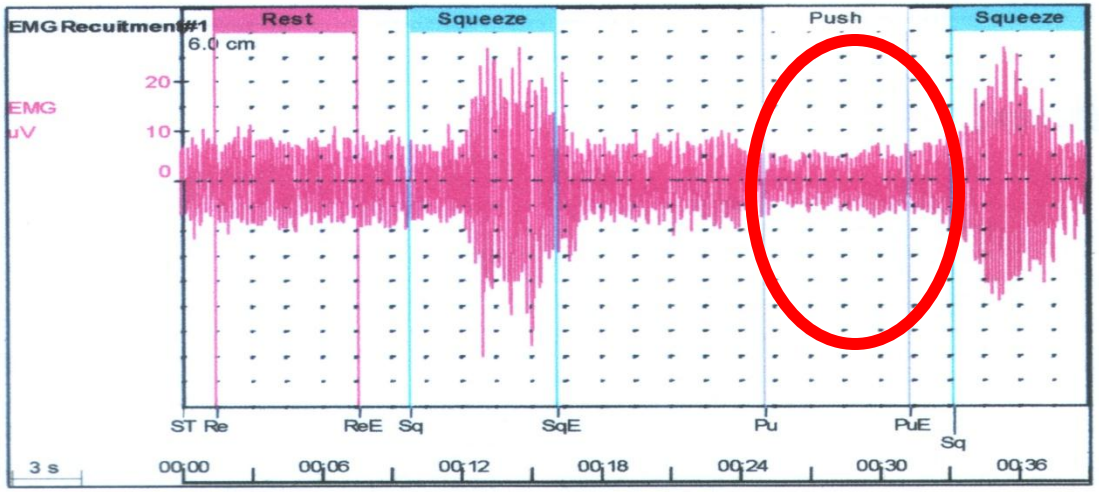


EMG Biofeedback

Pre-Rx



Post-Rx



Limitation of BFT

- Closed and quiet space AND a specialised therapist
- Time-consuming and repeated training required, thus adherence problem
- No established standard protocoal

Benefits of Biofeedback

- Best for women with very low or absent PFMT strength
- Patients with rectal compliance problem
- DD in Constipation

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