

Treatment of Anal Incontinence: Which Outcome Should We Measure?

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Learning Objectives

- To understand symptom assessment with patient questionnaires, stool diaries and patient interviews.
- To understand which questionnaires can be used for assessment of severity, both of symptoms and quality of life. To understand the advantages and drawbacks of different questionnaires and that a combination of tools may be required for a thorough and complete evaluation.
- To understand why and when is it also useful to assess anorectal structure and function.
- To understand why and how to assess outcomes after treatment for anal incontinence.

44.1 Introduction

Faecal incontinence is a common condition which adversely affects quality of life and has substantial economic costs worldwide [1]. Outcome measures may be subjective measurements (i.e. symptom assessment) or objective measurements (i.e. assessment of the structure and function of the anorectum). The impact of faecal incontinence is dependent upon patient perception as well as cultural and psychosocial factors.

Subjective assessment of symptoms includes how symptoms have changed following an intervention, impact upon quality of life and patient satisfaction. This can be achieved with patient questionnaires (Table 44.1), stool diaries and patient interviews. Objective assessment of the anorectal structure and anorectal function includes how measurements

have changed following treatment and the identification of persistent abnormalities in patients whose symptoms have failed to improve despite treatment (e.g. a persistent sphincter defect following attempted surgical repair). This can be achieved with anorectal physiology, saline or porridge continence tests or imaging with endoanal ultrasound or MRI. (Tables 44.2 and 44.3 summarise the outcome measures which can be used.)

44.2 Symptom Assessment

The underlying pathophysiology of faecal incontinence is multifactorial and so symptoms alone cannot be used to determine treatment [2]. However, the assessment of symptoms and how they have changed following treatment is an important indicator of how ‘successful’ any interventions are. The aim of any intervention should be to reduce severity of symptoms and improve a patient’s quality of life.

Patient questionnaires aim to assess faecal incontinence in terms of:

- The severity of symptoms (four main aspects (the frequency and type of incontinence, faecal leakage, faecal urgency) and reliance upon behaviour such as avoidance techniques and the use of adjuncts such as pads, plugs and antidiarrhoeal medications to control symptoms).
- The amount of bother inflicted upon the patient.
- The effects on quality of life (impact on factors such as self-esteem, confidence, anxiety and depression).

Bowel function diaries can also be used to assess severity. Qualitative analysis with interview data can be used to assess patients’ perception, their satisfaction with treatments and the acceptability of treatments [3].

There may be difficulty in comparing the results from questionnaires between different populations as the concepts of faecal incontinence are affected by different cultural and

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Table 44.1 The questionnaires which can be used to assess faecal incontinence

Questionnaire (authors)	Type	Purpose	Quality of Life (QoL)	Validation	Pros	Cons
<i>Symptom severity scores</i>						
Pescatori score (Pescatori et al.) [57]	Self-assessment (frequency to flatus/mucous, liquid or solid stool)	Diagnostic tool for frequency and type of anal incontinence	No		Simple to use. Sensitive to frequency	Limited to a score of only 6 points. Does not take amount in account
American Medical Systems score [58]	Self-assessment (retrospective review of symptoms over past 4 weeks)	Designed to assess outcomes after artificial bowel sphincter	No		Includes stool lost, frequency and effect on lifestyle	Complex
Jorge and Wexner Faecal Incontinence score/Cleveland Clinic Score (Jorge and Wexner) [5]	Designed to be filled in by physicians but also used as self-assessment (type and frequency, pad usage, lifestyle alteration)	Diagnostic tool, grade severity	Yes	Valid, responsive, reproducible [26]	Simple to use, easily understood by patients [6]	Subtle assessment of QoL. Does not include urgency, leakage amount or volume
St Mark's faecal incontinence score/Vaizey score (Vaizey et al.) [6]	Interview-based or self-administered questionnaire (about past 4 weeks)	Diagnostic tool, grade severity	Yes	Responsive [26], reproducible, high clinical validity and utility [6]	Includes urgency, antidiarrhoeal medication	Subtle assessment of QoL
The Revised Faecal Incontinence Scale (Sansoni et al.) [9]	Short 5-item assessment tool	For use in outcome and epidemiological research and clinical practice	No	Responsive, reliable	Short, reliable	
Faecal Incontinence Severity Index (FISI) (Rockwood et al.) [10]	Self-assessment (weighted scores for four types of leakage and five frequencies)	Diagnostic tool	No	Criterion validity, test-retest reliability and responsiveness to change have been partly or adequately validated [7]	Simple tool to assess severity	Does not include urgency, leakage amount or volume
<i>Cancer specific</i>						
LARS score (Emmersten et al.) [15]	Self-assessment	Diagnostic tool	No	Valid, reliable	Simple, quick evaluation	Correlates to QoL
MSKCC bowel function instrument (Temple et al.) [12]	Self-assessment survey (41 points) which can be used via email/paper/by interview in the phone [16]	Diagnostic tool to prospectively evaluate symptoms after sphincter preserving cancer surgery	No	Reliable, valid	Not routinely used (length and scoring influence its practicality)	Broad scope
<i>Quality of life scores</i>						
The Rockwood scale (FIQL) (Rockwood et al.) [24]	Self-assessment (29 items in 4 domains: lifestyle behaviour, depression, embarrassment)	Assessment of QoL specific to anal incontinence	Yes	Reliable, valid, responsive [25, 26]		Does not measure leakage. No single summary measure

Table 44.1 (continued)

Questionnaire (authors)	Type	Purpose	Quality of Life (QoL)	Validation	Pros	Cons
<i>Combined severity and quality of life</i>						
ICIQ-BS [29, 31]	Self-assessment (17 questions in 3 scored domains: bowel pattern, bowel control and quality of life)	Assessment of symptom severity, the bother of symptoms and QoL	Yes	Robust, valid, reliable, reasonable response to changes in symptoms and QoL following intervention	Assessment of the severity, the bother and QoL. Can be applied across international populations	Does not report on leakage amount or volume. More work needed to assess responsiveness to change [7]
Rapid assessment faecal incontinence score (RAFIS) (De La Portilla et al.) [27]	Self-assessment (includes visual analogue scale)	Rapid assessment of both severity and QoL	Yes	Significant correlation between RAFIS and Jorge-Wexner score and Rockwood scale. Reliable	Fast assessment of both severity and QoL	Superficial assessment of both aspects. Sensitivity to change in symptoms/QoL after treatment and test-retest has not been assessed
<i>Visual analogue scores</i>						
Visual analogue score severity (Devesa et al.) [33]	Self-assessment	Rapid assessment of severity	No	Not concordant with Jorge-Wexner	Fast assessment	Cannot replace other questionnaires
Visual analogue score QoL (Devesa et al.) [33]	Self-assessment	Rapid assessment of QoL	Yes	Only correlation with Rockwood scale was for embarrassment subscale	Fast assessment	Cannot replace other questionnaires

Table 44.2 Possible outcome measures for the treatment of anal incontinence

Outcome measure	Assessment tools	Importance	Limitations
Symptom severity	Questionnaires Bowel diaries Patient interviews	The aim of treatment is to improve symptoms and so these should be assessed	– There may be poor correlation between symptom severity and quality of life – As anal incontinence is multifactorial symptoms may persist despite an intervention which has solved one aspect; this will not be apparent on assessment of symptoms only
Bother	Questionnaires Patient interviews	The aim of treatment is to improve the bother of anal incontinence and so this should be assessed	– As above
Quality of life	Questionnaires Patient interviews	The aim of treatment is to improve quality of life and so this should be assessed	– Multiple contributing factors which are complex to assess
Patients' perception and acceptability of treatment	Patient interviews	Treatments must be acceptable to patients	
Anal sphincter function	Anorectal physiology	Objective parameters useful to assess change for research	– Changes in function may not be reflected in patient symptoms
Anal sphincter structure	Endoanal ultrasound MRI Volume vector manometry	Useful in research Useful in clinical practice if symptoms have failed to improve despite treatment or if symptoms deteriorate despite an initial improvement	– Changes in structure may not be reflected in patient symptoms

Table 44.3 A summary of the tools which can be used to measure outcomes after treatment of anal incontinence

Tool	Advantages	Disadvantages
Questionnaires	– Assess the patients' symptoms, amount of bother inflicted and quality of life which are the main outcome measures for any intervention	– Not all are responsive to change after intervention – Severity may be underestimated by patients due to avoidance behaviour or recall bias – Few questionnaires assess all aspects of severity and quality of life; multiple questionnaires may be required
Bowel diaries	– Avoid recall bias for symptom severity	– Although recommended by some societies, there are few published examples of those which can be used in clinical practice
Patient interviews	– Allow qualitative assessment (e.g. patient perception and the acceptability of treatments)	– Time consuming
Anorectal physiology	– Objective measure of change in anorectal function after treatment	– May not correlate with change in symptoms
Imaging (endoanal ultrasound/MRI)	– Objective measure of change in anorectal structure after treatment	– May not correlate with change in symptoms

psychosocial factors [4]. There are also few questionnaires which are used to evaluate severity and treatment outcomes that address all four aspects of severity simultaneously. Moreover, some assess severity of symptoms of anal incontinence and others assess quality of life in relation to anal incontinence, but few assess both. There have also been questionnaires designed to assess cancer-specific outcomes following the surgical treatment of rectal cancer.

44.2.1 Symptom Severity Questionnaires

Table 44.1 summarises the symptom questionnaires which assess faecal incontinence. The International Consultation on Incontinence (ICI) has recommended the Jorge-Wexner, St Mark's incontinence score and Revised Faecal Incontinence Scale for use in both research and clinical practice and the Faecal Incontinence Severity Index (FISI) for use in research (optional in clinical practice).

44.2.1.1 The Jorge-Wexner Score

The Jorge-Wexner score (also known as the Wexner score or the Cleveland Clinic Score) may be filled in by physicians or patients as a self-assessment tool [5]. It is simple to use and easily understood by patients [6]. It is used to grade severity of faecal incontinence and to assess its impact upon lifestyle; it was the first score to include usage of pads and lifestyle alteration as well as frequency and severity of episodes. However, it only allows a subtle assessment of quality of life and does not include urgency, leakage or volume. The International Consultation on Continence (ICI) has examined the score and found that construct and criterion validity, internal consistency, test-retest reliability and responsiveness are partly or adequately validated [7].

44.2.1.2 The St Mark's Incontinence Score

The St Mark's incontinence score (also known as the Vaizey score) is widely used to assess severity of anal incontinence [6]. It combines elements of the Pescatori score, the Wexner score and the American Medical Systems score with the addition of questions about urgency and the use of antidiarrhoeal medications. (The Pescatori score was one of the first scores designed to assess anal incontinence and simply diagnoses the frequency and type of anal incontinence. The American Medical Systems score was designed to assess outcomes after an artificial bowel sphincter.)

The St Mark's incontinence score was developed after clinicians noticed that patients used avoidance behaviour (remaining close to the toilet) to control their symptoms such that severity may be underestimated if urgency is not accounted for. It also reduces the emphasis placed on pad usage (compared to the Jorge-Wexner score) as pad usage may simply reflect the fastidiousness of the patient or co-existing urinary incontinence rather than anal incontinence severity. The St Mark's incontinence score has shown the greatest change after treatment compared to the Pescatori score, the Jorge-Wexner and the American Medical Systems score and is a useful score for comparison of patients and treatments.

A recent study of 390 patients by the team at St Mark's hospital compared patients' subjective perception of bowel control (scale 0–10) with the St Mark's incontinence score (a change in the score was documented in 131 patients who underwent bio-feedback). The St Mark's incontinence score correlated moderately well with patients' subjective perception of their symptoms and was reliable regardless of type of incontinence, age and gender. The authors reaffirmed that the St Mark's score is suitable for the evaluation of treatment outcomes [8].

44.2.1.3 The Revised Faecal Incontinence Scale

The Revised Faecal Incontinence Scale was developed to provide a short, psychometrically sound tool to assess severity of faecal incontinence before and after treatment [9]. The authors examined 61 people with faecal incontinence at baseline and 38 at follow-up and found the score was able to discriminate between different levels of incontinence severity, had superior internal consistency and test-retest reliability to the Wexner and St Mark's scores and was at least as responsive to detecting a change in incontinence after treatment as the Wexner and St Mark's scores.

44.2.1.4 The Faecal Incontinence Severity Index (FISI)

The Faecal Incontinence Severity Index is a diagnostic tool based on a type x frequency matrix which includes four types of leakage (gas, mucus, liquid and solid) and five frequencies (1–3 times per month, once per week, twice per week, once per day and twice per day). It was developed by surgeons (who suggested which aspects to include) and patients (who ranked each aspect) to assess severity of symptoms [10]. It can be used to assess treatment outcomes in research; for example, Zutshi used it to assess 10-year outcomes after anal sphincter repair for faecal incontinence and found that continence deteriorates in the long term following surgical repair [11]. Further work is needed for evaluating construct validity and internal consistency [7].

44.2.2 Symptom Severity Questionnaires Designed to Assess Outcomes for Rectal Cancer Treatment

Sphincter preserving surgery for rectal cancer is often possible, but functional results are not well understood [12], and many patients suffer with low anterior resection syndrome (LARS). Questionnaires have been developed to assess symptoms and their contributing factors and to consolidate the treatment of LARS and assess treatment outcomes [13]. The LARS score and MSKCC bowel function instrument (both discussed below) are suitable for the comprehensive and in-depth assessment of LARS although focused assessment with the Wexner score, St Mark's score or FISI may also be used.

Experts recommend that the consistent use of the same questionnaires in order that different institutions can compare outcomes and interventions [13]. A systematic review in 2017 found that there is still substantial variation in reporting of functional outcomes following low anterior resection and a consensus is still needed to improve and standardise research into low anterior resection syndrome and its treatment [14].

44.2.2.1 The Low Anterior Resection Syndrome Score (LARS Score)

The low anterior resection syndrome (LARS) score has been specifically developed to assess bowel dysfunction after low anterior resection and is the most useful tool for rapid assessment. It is a simple tool for quick evaluation, and the results can be categorised as no LARS (score 0–20), minor LARS (score 21–29) and major LARS (score 30–42). It is highly sensitive and specific to 'major' LARS [15]. The authors who developed this questionnaire invited all 1143 low anterior resection patients identified in a national Colorectal Cancer Database to complete the questionnaire, 961 participated. There were significant differences in groups with and without radiotherapy, tumour height above or below 5 cm and total mesorectal excision/partial mesorectal excision. The LARS score correlates with quality of life though quality of life is not assessed by the questionnaire.

44.2.2.2 The Memorial Sloan Kettering Cancer Center (MSKCC) Bowel Function Instrument

The MSKCC instrument was developed to prospectively evaluate bowel function following sphincter preserving surgery for rectal cancer [12]. The authors developed a 41-point bowel function survey after a literature review, expert opinion and patient interviews. They asked 184 patients to complete the survey (70.1% response rate) and found that the instrument was reliable and valid (radiation, coloanal anastomoses and handsewn anastomoses had significantly worse function).

This bowel function instrument can be used via the web/email, with paper or on the phone via interview [16]. The scope of the MSKCC bowel function instrument is broader than the LARS score as it covers the consequences of the symptoms as well as their severity reliable and is valid for assessment of outcomes after rectal cancer surgery. However, it is not routinely used as it is lengthy and its' scoring system (which involves re-coding, three subscale scores, a global score and a total score) may make it less practical [13].

44.2.3 Diary Monitoring

Symptom questionnaires may be misleading, only provide a snapshot of bowel habits and fail to reflect day-to-day variations or the relationship between bowel symptoms and stool form [17]. Bowel diaries are recordings of bowel habits which are widely used in diagnostic and interventional studies [18]. They may be more accurate than interviews or questionnaires with less recall bias [17, 19, 20]. For example,

Manning examined 150 patients and found a discrepancy between recalled and recorded figures for bowel frequency of three or more bowel actions per week in 16% of patients [20]. Diary monitoring provides an objective assessment of severity if filled out correctly by patients.

Although some societies advocate bowel diaries to assess bowel dysfunction and guide treatment, there are few published examples which can be used in clinical practice. The International Continence Society suggests the following are included: urgency, flatus and faecal incontinence (amount, consistency), passive staining/soiling, pads (changes, degree of soiling), straining/difficulty/time in the toilet, unsuccessful attempts to defecate, assistive measures (e.g. digital stimulation, manual evacuation, irrigation, laxative or rectal evacuant use), diet and fluids (type and/or timing) [18].

Daily stool diaries have been frequently used to assess outcomes after treatment of faecal incontinence with sacral nerve stimulation. Improvements in both the number of episodes of faecal incontinence per week (as recorded in the diary) and summative symptom scores (Cleveland score, St Mark's score) have been seen in both the short and the long term [21].

44.2.4 Quality of Life Questionnaires

There may be poor correlation between symptom severity and quality of life [22, 23]. Symptom scores alone do not allow satisfactory evaluation of the impact of faecal incontinence on quality of life, and therefore both aspects of faecal incontinence should be assessed [22]. Quality of life can be assessed using generic scales such as the SF36 questionnaire or specific scales such as the Rockwood scale.

44.2.4.1 The Rockwood Scale (FIQL)

The Rockwood scale (the Rockwood faecal incontinence quality of life scale (FIQL)) is a widely used tool to specifically assess the impact of faecal incontinence on quality of life [24] (it has also been translated into Spanish) [25]. It contains 29 different items to form four scales for the assessment of lifestyle, coping/behaviour, depression/self-perception and embarrassment, but there is no single summary measure. It was suggested by experts and then proposed to patients for ranking. Psychometric evaluation has shown that this is a reliable and valid measurement with significant correlations with the subscales in the SF-36 [24]. The International Consultation on Continence recommend its use in research but as an optional tool in clinical practice [18].

44.2.5 The Combined Assessment of Symptom Severity and Quality of Life

There are different scores to measure the severity of and impact on quality of life, of faecal incontinence but often not together, and some authors recommend a combination of scores to allow thorough assessment [26]. Minguez (who translated the Rockwood scale into Spanish) compared the Rockwood scale to the Jorge-Wexner score and found a strong correlation between the two [25]. They also found that pad usage is an independent factor which worsens quality of life scores. Bols examined the Vaizey score (St Mark's faecal incontinence score), the Jorge-Wexner score and Rockwood scale and concluded that although all total scores had adequate to excellent responsiveness and longitudinal construct validity, there were psychometric limitations for each. They also found a strong correlation between some items (particularly between embarrassment and coping/behaviour subscales). However, they still suggested a combination of the Wexner score for severity assessment with the Rockwood score for quality of life is required to enable a thorough and complete evaluation [26]. Bordeianou performed a prospective analysis in 502 consecutive patients to examine the relationship between the Faecal Incontinence Severity Index (FISI) and the Rockwood scale and SF-36. There was only moderate correlation with embarrassment and coping/behaviour and no correlation with lifestyle/depression, stressing the need to measure both variables (severity and quality of life) to determine the true impact of treatment [23].

44.2.5.1 The Rapid Assessment Faecal Incontinence Score (RAFIS)

The rapid assessment faecal incontinence score (RAFIS) was developed to quickly assess faecal incontinence in both its severity and impact upon quality of life. It consists of a visual analogue scale combined with the frequency of episodes of faecal incontinence within the last month. The authors examined 261 consecutive subjects and found a significant correlation between RAFIS and the Jorge-Wexner score and the Rockwood scale. They concluded that RAFIS is a valid and reliable tool to assess both aspects of faecal incontinence [27] (severity and quality of life) although only superficially and has not been routinely adopted for clinical or research practice.

44.2.5.2 ICIQ-BS

The modular international consultation on incontinence questionnaire for bowel symptoms (ICIQ-BS) has been developed as a comprehensive, robust, condition-specific self-completion questionnaire to assess bowel symptoms, the amount of bother they cause and their impact on quality of

life [28, 29]. It is the top-rated questionnaire for evaluation of symptoms severity and impact on health-related quality of life [30]. It can be applied across international populations in clinical practice and research and enables comparison of findings from different settings and studies [31]. Online versions are also psychometrically robust, in men and women, including Veterans [32]. It shows a reasonable response to changes in symptoms and quality of life following an intervention [29], but more work is needed in this domain [7].

44.2.6 Visual Analogue Scores

Visual analogue scores have also been developed to assess the severity of faecal incontinence and its impact upon quality of life but have not been shown to be a suitable substitute for other scoring systems. Devesa examined 103 consecutive patients affected by faecal incontinence to determine if a single score represented in a visual analogue scale (VAS) could replace the Jorge-Wexner score and Rockwood faecal incontinence quality of life scale. A VAS for quality of life could not substitute all four subscales of the Rockwood score. A VAS for severity was not concordant with the Jorge-Wexner score. The authors concluded that a VAS does not assess the same issues for severity of symptoms and impact upon quality of life for faecal incontinence as the Jorge-Wexner score and Rockwood scale. The only significant correlation was between the VAS for faecal incontinence and the embarrassment subscale of the Rockwood scale [33].

44.2.7 Interview Assessment

Interviews can be used for qualitative assessment and to assess patient acceptability of treatments and patient perception of their symptoms and how they have changed following an intervention. For example, Thin performed a randomised clinical trial of sacral versus percutaneous tibial nerve stimulation in patients with faecal incontinence and qualitative interview data suggested both treatments had high acceptability amongst patients [3].

Symptom severity questionnaires can also be used in an interview scenario. For example, the St Mark's score can be used as both an interview-based and a self-administered incontinence score [34].

44.3 Anorectal Structure and Function

Patients' symptoms, the amount of bother experienced by the symptoms and their impact upon quality of life may be considered the most important and relevant outcome mea-

asures in the treatment of anal incontinence. However, anorectal structure and function are also useful outcome measures, particularly in the context of therapeutic trials for faecal incontinence. This is because:

1. Symptom severity may be underestimated by day-to-day variation in symptoms and patient avoidance of certain activities to reduce incontinent episodes.
2. The pathophysiology of faecal incontinence is multifactorial, and therefore there may be several contributing factors towards symptoms which may not all be solved with a single intervention.
3. Objective parameters may be useful to determine outcomes in uncontrolled studies.
4. If faecal incontinence initially responds to treatment and then symptoms deteriorate, there may be failure of treatment or another contributing factor (e.g. recurrent incontinence after sacral nerve stimulation due to device malfunction) [35].

Tests of anorectal structure and function include anal manometry, rectal compliance and sensation with either balloon studies or Barostat, saline continence tests, porridge enema, pudendal nerve terminal motor latency, needle EMG of the external sphincter, endoanal ultrasound and endoanal MRI.

Tests of anorectal structure and function in a research context can help to strengthen the argument for implementation of certain therapies and ensure treatments are more widely available. Previously, although biofeedback treatment was known to ameliorate symptoms in patients with faecal incontinence, it was not known if it also caused an improvement in anorectal function. Rao examined anorectal manometry, saline continence tests, prospective stool diaries and bowel satisfaction scores before and after biofeedback for faecal incontinence and found a significant improvement in all parameters in both the short and long term [36, 37]. The examination of anorectal function as well as patient symptoms in these studies helped to highlight the effectiveness of biofeedback therapy for faecal incontinence. Norton performed a randomised control study which examined conservative treatment in 171 patients. All versions of conservative treatment (from standard advice to hospital biofeedback plus a home electromyogram biofeedback device) improved continence, quality of life, psychological well-being and anal sphincter function (measured with a diary, symptom questionnaire, continence score, patient's rating of change, quality of life, hospital anxiety and depression score and anorectal manometry). The assessment of anorectal manometry showed subjective and objective improvement in faecal incontinence following all types of conservative measures.

44.3.1 Anorectal Physiology

Anorectal physiology includes anorectal manometry, sensory measurements and neurophysiology.

44.3.1.1 Anorectal Manometry

Anorectal manometry includes conventional anal manometry, high-resolution manometry, high-definition manometry, vector volume manometry and ambulatory manometry. Anorectal manometry measurements include functional anal canal length, maximum resting pressure, maximum squeeze pressure, involuntary squeeze pressure, endurance squeeze pressure and resting pressures.

Manometry may be useful to evaluate treatment outcomes [38]. For example, in patients with low anterior resection syndrome (LARS), there is reduced anal pressure after surgery which can be treated with biofeedback. The level of incontinence correlates with reduced resting pressure levels [39, 40], and a recovery in anorectal function can be monitored with anorectal manometry [41]. Improvements in faecal incontinence and quality of life are also associated with a significant increase in maximal anal resting pressure following artificial sphincter reimplantation for faecal incontinence [42], and some have observed reduced anal pressures in patients with persistent incontinence despite surgical repair of obstetric anal sphincter injury [43].

However, some have found no association between improvement of symptoms and anal manometry pressures following treatment of faecal incontinence. Sorensen found no correlation between anal pressures and severity of symptoms after primary obstetric injury repair [44]. Grey examined 85 patients following anal sphincter repair, and whilst there were significant improvements in quality of life, there were no changes in anal manometry [45]. This may be explained by a systematic review of long-term outcomes after anal sphincter repair for faecal incontinence which analysed data from 16 studies comprising nearly 900 repairs. There was poor correlation between severity of symptoms and quality of life, and the authors concluded that despite worsening results over time, most patients remain satisfied with their sphincteroplasty [46]. This may be due to the variety of techniques used; as more advanced manometric techniques are used more widely (e.g. high-definition anal manometry) and as a consensus emerges regarding normal values, changes in anal manometry may reflect changes in symptoms more frequently.

44.3.1.2 Sensory Measurements

Sensory measurements are made with rectal balloon distention, Barostat and rectal impedance studies. Measurements include rectal sensation (first and urge sensation and maximal tolerated

volume) and compliance. Progress after treatment with either pelvic floor rehabilitation or rectal sensitivity training with balloon distention (the subject is trained to feel the distention and to tolerate progressively lower or larger volumes depending on if there is rectal hyper- or hyposensitivity present) can be documented according to the volumes tolerated. However, although there may be an improvement in rectal capacity, this may not be reflected by patients' symptoms. For example, Terra examined 281 patients and found a moderate improvement in maximal tolerated volume and severity of faecal incontinence, but only a few patients had a substantial improvement in the St Mark's faecal incontinence score [47]. The authors have done further work which concludes that additional tests (including anal sensitivity testing, anal manometry and endoanal ultrasound) only have a limited role in assessing treatment outcomes after pelvic floor retraining and will not necessarily predict any improvement in symptoms [48].

44.3.1.3 Neurophysiology

Neurophysiology includes EMG (electromyography) and pudendal nerve terminal motor latency. Measurements include assessment of activity in the external sphincter and puborectalis. EMG can be used for strength training during biofeedback and be used to quantify the reinnervation of the external anal sphincter by detecting a prolongation in the motor unit potential [18].

44.3.2 Saline Continence Tests or Porridge Enema

Following a sphincter repair with defunctioning colostomy or low anterior resection with a defunctioning loop ileostomy, a water holding procedure provides a simple examination for the evaluation of the anal sphincter function prior to stoma reversal. Saline or another liquid (e.g. porridge) is inserted into the rectum via a catheter and the patient asked to walk around with a pad in for 20 min to assess continence [38, 49].

44.3.3 Imaging

44.3.3.1 Endoanal Ultrasound

Endoanal ultrasound may be used pre- and post-surgical sphincter repair to assess the effect of the operation on the sphincter defect and to investigate unsatisfactory results after surgery [50] (Fig. 44.1).

Some have found a good correlation between patient symptoms and post-operative appearances on endoanal ultrasound. Felt-Bersma examined 18 patients before and after anal sphincter repair. There was not only good correlation between the clinical effect of sphincter repair and changes on endoanal ultrasound and anal manome-

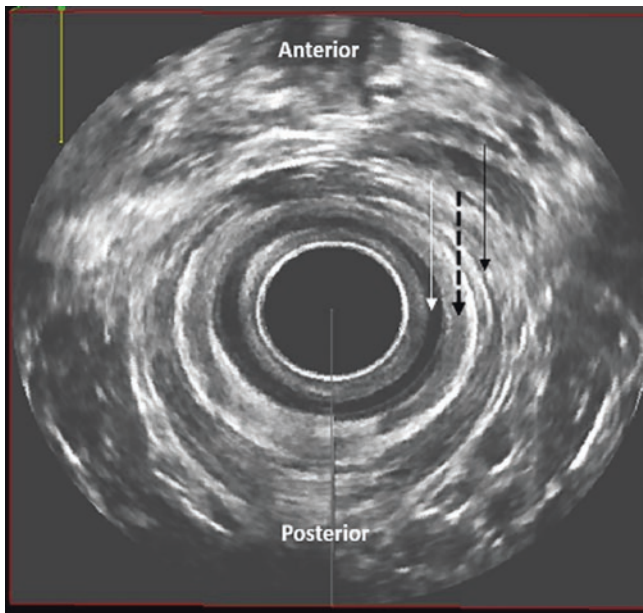


Fig. 44.1 Endoanal ultrasound. A sagittal view of the anal sphincter complex. The white arrow shows the internal anal sphincter, the dashed arrow shows the longitudinal muscle and the black arrow the external sphincter

try, but post-operative persistent incontinence could be attributed to remaining sphincter defects [51]. Norderval found improved St Mark's scores correlated with the length of the external anal sphincter defect following primary repair of obstetric anal sphincter tears in 63 women (61 controls) (the integrity of the internal anal sphincter did not differ) [52]. Sorensen examined 59 women (29 cases after primary obstetric injury repair and 30 controls) and found that anterior sphincter length correlated with severity of incontinence (though there was no correlation between anal pressures and severity of incontinence) [44].

Endoanal ultrasound can also be used to assess the safety of new treatments, for example, to ensure that there is no migration of an artificial bowel sphincter [53] or intersphincteric bulking agents such as the Gatekeeper™ [54].

44.3.3.2 MRI

MRI is equivalent to endoanal ultrasound for the assessment of external sphincter defects but not internal sphincter defects [55]. Research has shown that external anal sphincter atrophy following sphincteroplasty (for obstetric injury causing incontinence) can only be visualised on endoanal MRI but not ultrasound and that atrophy affects continence post-operatively [56]. However, the quality of ultrasound has improved since this study, and although imaging the sphincter post-operatively may be useful for research purposes, it is often not available for routine post-operative assessment in clinical practice.

44.4 Future Directions

Questionnaires which incorporate both severity of symptoms and quality of life should be further developed and routinely used [57].

A consensus on assessment of low anterior resection syndrome and which tool used to assess how patient symptoms change after treatment is needed.

More work is needed to assess and improve responsiveness to change after treatment for symptom questionnaires.

Further work will be done on how changes in anorectal structure and function relate to patient symptoms.

Take-Home Messages

1. Treatment of anal incontinence may be assessed by subjective or objective outcomes.
2. It is important to assess outcomes to:
 - Check that treatments are successful in the short, medium and long term.
 - Understand why a treatment has or has not worked.
 - Allow improvement in treatments.
 - Increase the adoption of treatments by multiple units.
 - Check patient acceptability of treatments.
3. Subjective outcomes:

Symptoms (severity, bother and quality of life) may be assessed with patient questionnaires, stool diaries and patient interviews.

Often a combination of questionnaires is required for the complete evaluation of both symptom severity and impact upon quality of life. The ICIQ-BS is the only questionnaire at present which assesses symptoms, quality of life and bother of symptoms simultaneously.

Patients may use avoidance behaviour which leads to underestimation by the clinician of symptom severity.
4. Objective outcomes:

Anorectal structure and function may be assessed with anorectal physiology, saline or porridge continence tests, endoanal ultrasound and endoanal MRI.

The pathophysiology of anal incontinence is multifactorial and so the assessment of the anorectal structure and function may explain why symptoms are not solved with a single intervention.

Assessment of anorectal structure and function may explain a recurrence of symptoms despite initial success (e.g. recurrent incontinence after sacral nerve stimulation due to device malfunction) and may be useful to determine outcomes in uncontrolled studies.

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