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CONTENTS

Pathogenesis and Pathology of Defecatory Disturbances

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Abstract: In recent years the number of patients with defecatory disturbances has increased due to an aging population, stress, and other related factors. The medical community has failed to focus enough attention on this condition, which remains a sort of psychosocial taboo, enhancing patient anxiety. Defecatory disturbance classified according to cause and location can fall into one of four groups: 1) Endocrine abnormalities; 2) Disturbances of colonic origin that result from the long-term use of antihypertensive drugs or antidepressants or from circadian rhythm disturbances that occur with skipping breakfast or lower dietary fiber. Irritable bowel syndrome (IBS) and melanosis coli cases fall under this category; 3) Defecatory disturbance originating in the rectum (outlet obstruction syndrome). Rectocele, rectal prolapse, concealed prolapse, mucosal prolapse syndrome, and irritable rectal syndrome fall into this category. Pelvic descent and perineal descent are often caused by a dysfunction of the pudendal nerves that innervate the atonic levator ani muscle that forms the basis of the pelvis; and 4) Defecatory disturbance caused by anal diseases such as hemorrhoids, anal fistulas, fissure, postoperative complications, as well as other factors. The same individual may have more than one of the complications listed above. Therefore, diagnosis by thorough examination is essential.

Key words: Dyschezia; Defecational disturbance; Pelvic descent; Pudendal nerve neuropathy; Constipation; Diarrhea

Introduction

Recently, the number of patients with constipation, difficulty in defecation, or in turn diarrhea or fecal leakage has increased. The three main causes of defecation difficulty include: (1) aging itself; (2) appearance of latent dysfunction due to aging; and (3) the effects of mental stress on the lower digestive organs.

Urinary incontinence has also been increas-

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ing for similar reasons and has gained the attention of both the media and the medical community. However, fecal incontinence is still regarded as somewhat taboo and the cause of little focus even though many patients suffer from the condition.

Seven years ago a group of doctors was assembled to study coloanal dysfunction with the aim of enhancing the medical science of coloproctology through study of anal, rectal, and colon dysfunction as a unified organ system instead of the current approach in which they are studied individually.

Pathogenesis of Disturbed Defecation

1. Endocrine abnormalities

Fecal disturbances can be caused by endocrine abnormalities. For example, hypothyroidism is known to cause constipation and hypoadrenocorticism to cause diarrhea. In short, not only the digestive organs should be considered when dealing with fecal disturbances.

2. Disturbed defecation originating in the colon

Fecal disturbance of colonic origin can be attributed to various etiologies. The etiology of organic diseases such as tumors or enterocolitis should be excluded and examined clinically through barium enema, endoscopy, biopsy, and bacterial culture.

(1) **Constipation**

Constipation is a condition that predominantly afflicts females including female babies. With increasing age, insufficient exercise or food intake decreases the motility of the intestines. Long-term administration of antihypertensive agents, anti-ulcer medicine, or antidepressants may also reduce intestinal motility, leading to constipation. Since many of these medications should be continued to sustain patient health, consultation with the prescribing physician is necessary.

Intestinal motility is influenced in large measure by circadian rhythm. When eating breakfast or drinking cold water, stimulation of the stomach is transmitted to the vagus nerves, spinal cord, and pelvic splanchnic nerves. The result is immediate peristaltic activity in the left colon with the sudden descent of fecal matter from the left colon into the rectum. These events result in the desire to defecate. This sequence of events is known as the gastro-colic reflex, which works to produce smooth defecation with little or no straining. However, a disturbed circadian rhythm that can occur with skipped breakfast, inadequate sleep, or not enough toilet time for complete evacuation adversely affects the gastro-colic reflex.

Another cause of constipation is the low residue content of currently available foods. Decreased food intake, particularly a reduction of ingested dietary fiber, reduces the intestinal contents and stimulation of the intestines, which can lead to constipation. Dieting for weight control is considered to be one of major contributing factors for constipation. In Japan, hypotonic constipation has been the predominant type. In this case, constipation becomes aggravated by a reduction in exercise, and tendency of elderly patients to become depressed. Yet another cause of disturbed defecation is mental stress, in which abnormal stimulation from the central nervous system is relayed to the intestines via the sympathetic nerves, thus leading to hypertonic constipation.

Irritable bowel syndrome (IBS) comprises constipation type, diarrhea type, constipation-diarrhea mixed type, and gas type. IBS has been a major ailment in Europe and America, but the number of cases is also on the rise in Japan. Recently, Rome II was adopted as the worldwide diagnostic criteria. IBS is defined as the long-term symptoms of abdominal pain, discomfort, disturbed defecation, and an abnormally shaped stool.

In addition to the above-mentioned various causes of constipation, one patient may present multiple conditions which make resolution and diagnosis of the pathogenesis more complicated and adequate treatment difficult. Therefore, while it is not always easy to determine

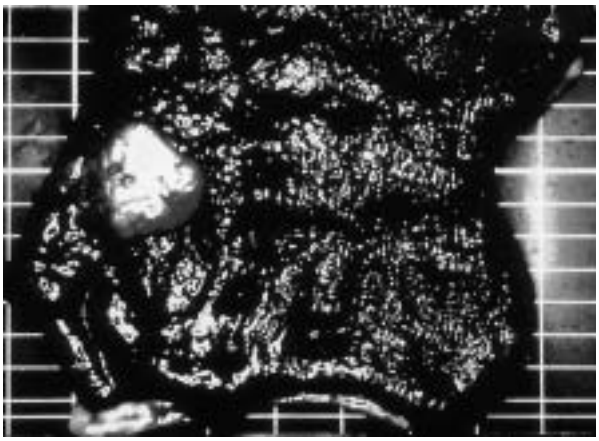

Fig. 1 A case of melanosis coli accompanied with early-stage carcinoma caused by long-term intake of senna

Fig. 2 Contrast medium and markers for examination of intestinal transit
At breakfast, lunch, and dinner, 10 m*l* of barium and each of 3 markers of one knot, two knots, and three knots are taken simultaneously. Abdominal X-ray is taken the next morning.

the pathological condition of these patients, this process is essential to adequate treatment.

Moreover, the effect of irritant laxatives as a cause of hypertonic constipation should not be ignored. For example, the long-term intake of cathartics containing senna, which is contained in almost all commercially available cathartics, makes the intestine spastic, resulting in difficult evacuation. Consequently, an increase in the dosage of medication is needed which eventually results in the deposition of melanin in the mucosa and a condition called melanosis coli (Fig. 1). Severe melanosis coli is considered to lead to anomalies in the intestinal motor neurons. In the event that severe melanosis should occur, it is necessary to discontinue the drug and change to a more mild laxative.

(2) **Diarrhea**

Similar to cases of constipation, it is necessary to establish the pathogenesis in diarrhea patients. Lifestyle, diet, systemic complications, and drug intake should all be thoroughly investigated. Tests including endoscopy, biopsy, and in some cases, bacterial culture, should be performed to exclude the organic diseases. Transit time of the intestinal contents and the shape and motility of the intestines should also be measured by simultaneous intake of a small amount of barium and markers administered (Fig. 2). Analysis of patient mentality is also important and the cooperation of case-workers is needed when appropriate.

3. Defecatory disturbance of rectal origin

Rectally induced difficulty in defecation can be attributed to various pathological conditions that originate in the rectum.

Rectocele is a sort of slackening of the rectovaginal wall. This wall becomes thinner or slack and feces accumulate in the anterior pocket just above the anus resulting in difficult evacuation (Fig. 3). This phenomenon tends to occur almost solely in females in multipara, although it can also occur in nullipara.[1)]

A classic symptom of this condition is the evacuation of feces by digital pressure against the posterior wall of the vagina. Digital examination reveals that the anterior wall of the rectum just above the anus is pouch-shaped. In most cases, the pouch extends to the lower part of the anus, that is, the anterior sphincter muscle, and is accompanied by dysfunction of the anterior sphincter.

Rectal prolapse is increasing in the elderly, which is a prolapsed rectum that protrudes outward causing dilation of the sphincter muscle,

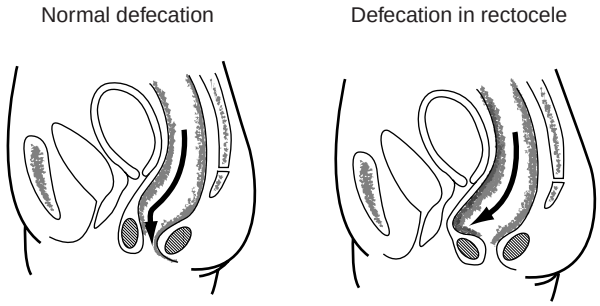

Fig. 3 Natural defecation and defecation in a rectocele patient
With normal defecation, the rectum runs along the anterior surface of the sacrum and coccyx. Feces descend along the rectum and are evacuated once curved backward at the superior border of the sphincter muscle. In rectocele, the anterior wall of the rectum is thin, forming a pouch at the frontal side. Since feces tend to accumulate in this pouch, the patients have difficulty in defecation even when they strain themselves.

resulting in sphincter dysfunction and fecal leakage. If the degree of sphincter dysfunction is severe, treatment becomes necessary. Diagnosis of rectocele is difficult if based only on observation thus defecography must be performed.

Concealed prolapse is invagination of the rectal wall inside of the rectum fecal passage that creates an anomalous fecal passage. However, the diagnosis should not be made hastily unless symptoms and findings specific to this disease are ascertained, even if conventional images are observed on X-ray.

Solitary ulcer of the rectum occurs when an ulcer covered with scar tissue develops at the rectum, resulting in stimulation of the rectum to produce a sensation of incomplete evacuation accompanied by pain or hemorrhage.[2] Pathologically this shows specific fibromuscular obliteration.

Mucosal prolapse syndrome (MPS) manifests itself as polypoid lesions developing on the anterior wall of the rectum, that produce difficult evacuation as well as discomfort, a sensation of incomplete evacuation, and hemorrhage. MPS tends to occur in people that strain during excretion. When the mucosa becomes detached, it results in a solitary ulcer of the rectum as mentioned above.

Irritable rectum syndrome is characterized by a sensation of incomplete evacuation, difficult evacuation, discomfort, and fecal abnormality. This syndrome accompanies IBS, and difficult evacuation continues even after IBS is controlled by conservative therapy. Upon digital examination, the rectum shows spasm and, in many cases, there is an accumulation of feces that look like scybala or thin ribbons. To examine this disease, a rectography is performed by injecting a small amount of barium into the rectum before defecation. The patients are made to evacuate stool to determine whether feces have yet to be evacuated, or there is only the sensation of incomplete evacuation. Observations are also made on whether the patients can actually evacuate the feces and also whether they have a spastic rectum. The pathogenesis of this disease is thought to be related to dysfunction of the pelvic splanchnic nerves which innervate the rectum and is often difficult to treat.

Descent of levator muscles, intrapelvic organs and the perineum results when connective tissues within the pelvis or perineum become fragile and stretched. Rectal prolapse, anal prolapse, rectocele, uterine prolapse, vaginal prolapse, or bladder prolapse can occur alone or in combination. Examination through simultaneous imaging of various pelvic organs should be performed to determine any abnormal positioning of these organs.[3]

Behind descent of one intrapelvic organ, there exist descents of other organs. The descended organ consists of anteriorly positioned urinary organs, centrally positioned reproductive organs, and posteriorly positioned digestive organs. The above-mentioned rectocele, concealed prolapse, and mucosal prolapse syndrome are also included in the broader category of this pathological condition. Even when one disease is treated, another can appear, in succession. Therefore, comprehensive determination by thorough history taking, and examination is important to reveal the true pathological condition.

Perineal descent is caused by loosening of the levator ani that forms the pelvic floor. In this case, even if the patient strains during evacuation, only the levator ani descends and enhancement of the intraabdominal pressure necessary for fecal evacuation is not attained.

The cause for the descent of various intrapelvic organs lies in their fragility and in the destruction of connective tissues supporting these organs. The result is difficult feces evacuation which leads to further excessive straining, creating a vicious cycle. Another fundamental cause of descent of intrapelvic organs is damage to pudendal nerves. Damaged pudendal nerves cause reduced tonicity and descent of the levator ani muscle, and overextension and dysfunction of the pudendal nerves. The recovery of damaged pudendal nerves is almost impossible and therefore, early treatment for the prevention of this descent is important.

In addition to the above-mentioned imaging of various organs, tests for sensory and motor disturbances of the rectum, anus and spinal cord should be comprehensively performed and an exact diagnosis should be made. In serious cases, surgical treatment that elevates the various descended pelvic organs, including the levator ani, is indicated. In moderate cases, electric stimulation and biofeedback therapies should be performed.

4. Difficult defecation of anal origin

Finally, difficult defecation caused by anal disease will be discussed. Various anal diseases can cause difficult evacuation if they are severe in degree.[4)]

With hemorrhoids, the most frequent among the three main anal diseases, anal prolapse causes occlusion of the anus and leads to difficult evacuation. The more the patient strains, the more serious the prolapse becomes and a vicious cycle has begun.

In anal fissure, the second most frequent anal disease found more frequently in females, difficult evacuation occurs due to stenosis of the anus.

In deep anal fistula, dysfunction of the sphincter muscle or rectum occurs.

Moreover, after anal surgery, postoperative complications such as Whitehead anus, mucosal prolapse, and stenosis, and severance or loss of the sphincter muscles may also lead to difficult evacuation or leakage.

These various anal diseases and postoperative complications have not really been considered as causative factors of difficult evacuation. However, according to Tsuji *et al.*,[5)] tonicity of the sphincter muscle remarkably decreases after the age of seventy, and fecal leakage appears eventually.

Therefore, in anal surgery, sufficient care should be taken to prevent future dysfunction.

Moreover in females, many cases of anal dysfunction result from rupture or overextension of the sphincter muscles during delivery. And in these cases, anal dysfunction appears as fecal leakage with aging. This disturbed function is often aggravated by pudendal nerves: in many female cases, loss or damage of the pudendal nerves is caused by friction of the nerve caught between the inner surface of the pelvis and the head of the neonate during delivery.

Conclusion

Difficulty in evacuation has been represented as simple constipation or diarrhea; however, these conditions are actually much more complex. Further comprehensive studies on the pathology underlying these conditions will provide the only relief to the many people suffering from these diseases.

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Diagnosis of Impaired Defecatory Function with Special Reference to Physiological Tests

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Abstract: Detailed assessment of clinical symptoms is the first and most important step for the accurate diagnosis for patients complaining of defecatory dysfunction. Organic diseases such as colorectal cancer and inflammatory bowel disease should then be ruled out with physical examination including digital rectal examination, proctoscopy, colonoscopy, and double contrast enema. Diabetes, endocrine disease, and disorders of nervous system are possible causes of defecatory dysfunction. Physiological tests include transit time measurement, anorectal manometry, anorectal sensory tests, rectoanal inhibitory reflex, and defecography. Since currently available physiological tests are not perfect as diagnostic modality, the results should be carefully correlated with clinical symptoms. Furthermore, psychological and psychiatric assessment is very important in determining the indication for aggressive treatment such as surgery.

Key words: Anorectal physiology; Anal manometry; Anorectal sensation; Defecography

Introduction

Diagnosis of impaired defecatory function is commenced with detailed history-taking, visual inspection, palpation, and anoscopy. These basic diagnostic procedures are the most important tools for the accurate diagnosis. Then, colonoscopy and barium enema should be performed to exclude organic diseases. Physiological tests are performed as the final step to explore the mechanism of symptoms. In the treatment of impaired defecatory function, the evaluation of psychological and psychiatric conditions is also essential. In this article, we describe various physiological tests and their abnormalities associated with diseases and conditions presenting symptoms of impaired defecatory function.

History

Symptoms of impaired defecatory function

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are those such as frequent bowel movement, fecal incontinence and soiling (involuntary leakage of a small amount of stool), constipation, evacuation difficulty, defecatory urgency (difficulty in deferring defecation), and tenesmus, and are closely correlated with their mechanisms. Frequent bowel movement, fecal incontinence, defecatory urgency, and tenesmus suggest impaired anal sphincter function, decreased rectal capacity or impaired discrimination between feces and flatus by the anal canal mucosa. Constipation and difficult evacuation suggest delayed intestinal transit or anorectal outlet obstruction.

Some symptoms are associated with organic diseases of the anorectum. Others occur after anorectal surgery. In addition, endocrine diseases such as diabetes mellitus and hyper- or hypothyroidism, and systemic neurological disorders also cause symptoms of impaired defecatory function. In such cases, treatments of diseases that impair defecatory function are mandatory as well as the treatment of impaired defecatory function itself.

Physical Examination and Endoscopy

Visual inspection, palpation, and digital examination may reveal organic diseases such as hemorrhoid, anal fistula, rectal cancer, and rectal prolapse. Colonoscopy and barium enema should be performed routinely to exclude large bowel cancer and inflammatory bowel disease.

Physiological Tests for Defecatory Dysfunction

1. Transit study

Transit study is indicated in patients complaining of diarrhea or constipation. Sequential abdominal x-ray following oral administration of radio-opaque markers (commercially available in US; Fig. 1) is a simple and useful test. Many patients complaining of diarrhea or constipation have normal intestinal transit times.[1)]

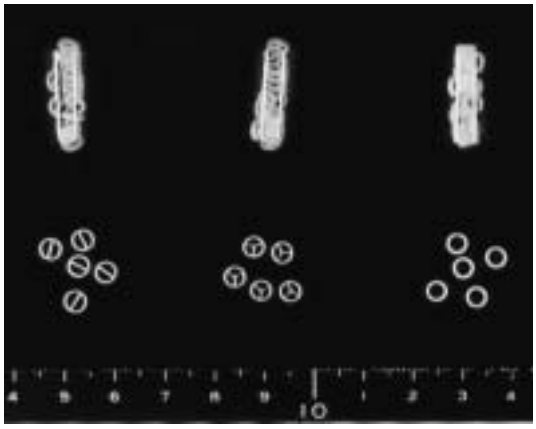

Fig. 1 Radio-opaque markers used for intestinal transit study.
Three shapes (ring, tri-chamber and double D) are commercially available in the United States.

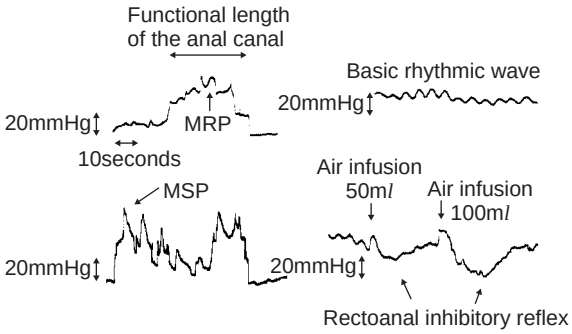

Fig. 2 Values and findings recorded in anorectal manometry

2. Anorectal manometry

Anal sphincter is constituted of the internal anal sphincter, which is a smooth and involuntary muscle, and the external anal sphincter, which is a striated and voluntary muscle. Anorectal manometry quantifies functions of these two muscles.

With patients in the left lateral position, a pressure sensor is inserted into the rectum. Asking patients to relax the anus, the pressure sensor is gently pulled out from the rectum. When the pressure sensor enters the high-pressure zone (HPZ) formed by the internal anal sphincter, a rise in pressure is recorded. The highest pressure in the HPZ at rest is

maximum resting pressure (MRP), and the longitudinal length of the HPZ is the functional length of the anal canal. In HPZ, a small regular change in pressure with approximately 15 cycles per second, termed basic rhythmic wave, shows the activity of the internal anal sphincter at rest (Fig. 2).

The internal anal sphincter prevents leakage of rectal content at rest. Fecal incontinence and soiling in the early postoperative period after rectal resection for rectal cancer and ulcerative colitis are thought to be due to the impaired function of the internal anal sphincter.[2] Decreased MRP, shortened functional length of the anal canal, and diminished amplitude and frequency of basal rhythmic wave are recorded. In contrast, patients with hemorrhoids and those with chronic anal fissure have increased MRP due to a spasm of the internal anal sphincter.

The external anal sphincter function is evaluated by maximum squeeze pressure (MSP), which is the highest pressure recorded during maximum voluntary contraction of the pelvic floor muscles, with the pressure sensor mobilized within HPZ. The external sphincter prevents fecal leakage when the rectum is distended due to the arrival of flatus or feces, or the rise in intra-abdominal pressure due to a change in posture or coughing. Severe impairment of the external sphincter function causes fecal incontinence. Injury to the external sphincter due to obstetric trauma and operation for complex anal fistula, and damage to the pudendal nerve are associated with decreased MSP.

Prolonged and ambulatory recording of anal pressure using a portable system equipped with micro-tip pressure transducer and digitrapper has made it possible to evaluate the influence of activities such as diet and sleep on anal pressure.[3]

3. Other methods for evaluation of the anal sphincter function

Ultrasonography of the anal sphincters has an advantage of minimal invasiveness and the ability to identify sphincter defect and tear.[4] Electromyography is useful in discriminating causes of impaired external anal sphincter function being neurogenic or myogenic. Anismus, which is a paradoxical contraction of the external anal sphincter during attempt of defecation resulting in difficult evacuation, is also detectable with electromyography. Pudendal nerve terminal motor latency is measured using a dedicated endo-anal probe, the tip of which is equipped with an electrode stimulating the pudendal nerve and the root of which has an electrode recording the contraction of the external anal sphincter.[5] Prolonged motor latency suggests pudendal neuropathy.

4. Sensory tests of the rectum and anus

The measurement of sensory threshold, maximum tolerable volume, and compliance is commonly performed as a test of rectal sensation. A latex balloon is placed in the rectum and inflated with air. Sensory threshold is the inflated volume when a subject first feels the presence of flatus in the rectum. After this sensation spontaneously disappears, the patient begins to constantly feel the presence of flatus if the inflation of the balloon is continued. Further inflation of the balloon finally becomes impossible because the subject feels a strong desire to evacuate or discomfort. The volume of the balloon at this situation is the maximum tolerable volume. Rectal compliance is calculated by recording the change in intra-rectal pressure during the inflation of the balloon.

Patients after rectal resection for disease such as rectal cancer have decreased sensory thresholds and maximum tolerable volume, resulting in frequent bowel movement.[2] In contrast, these values are abnormally increased in some patients with chronic constipation or megarectum.

Anal canal sensation is a somatic sensation conducted by sensory fibers of the pudendal nerve. This sensation is important in the discrimination of the content entering the rectum,

Fig. 3 Defecography
A: A portable commode placed on the x-ray fluoroscopy apparatus. Clear lateral images of the anorectum are obtained with the aid of a rubber tire filled with water on the commode.
B: The introduction of artificial stool in the left lateral position
C: x-ray in the sitting position

and is quantified as the sensory threshold to constant electrical current stimulus.[6] Patients with fecal incontinence due to pudendal neuropathy have a high sensory threshold, which means reduced sensation. In addition, patients with hemorrhoids also present with reduced sensation due to a downward displacement of insensitive rectal mucosa into the anal canal.

5. Rectoanal inhibitory reflex

Rectoanal inhibitory reflex is a relaxation of the internal anal sphincter in response to rectal distention. It is recorded using a pressure sensor placed in the anal HPZ during balloon distension of the rectum. A quick reduction of the anal canal pressure is recorded several sec. after the balloon distension (Fig. 2). The reduced pressure is transient and the pressure is usually restored after 10 to 30 sec. However, as the extent of rectal distension increases, the reduction of the anal pressure becomes profound and prolonged, and finally the anal pressure becomes continuously reduced.

Normal rectoanal inhibitory reflex shows intact intramural nerve routes of the rectum and anus. In Hirschsprung's disease, rectoanal inhibitory reflex is absent due to the loss of intramural nerve plexus. In patients with severely impaired internal anal sphincter function and those after rectal resection, this reflex is occasionally absent.

6. Defecography

Defecography is a test for dynamic assessment of anatomical change of the pelvic floor and anorectum during pelvic floor contraction and defecation. We prepare artificial stool having similar consistency to stool by mixing barium powder and rice bran, and introduce the artificial stool into the rectum. We obtain static lateral x-ray images at rest, during maximum pelvic floor contraction, and during evacuation effort. We use ordinary contrast medium for x-ray fluoroscopy apparatus and a portable commode (Fig. 3). Video images during evacuation are also recorded.

Patients with outlet obstruction, which is an impaired evacuation at the anorectum, are

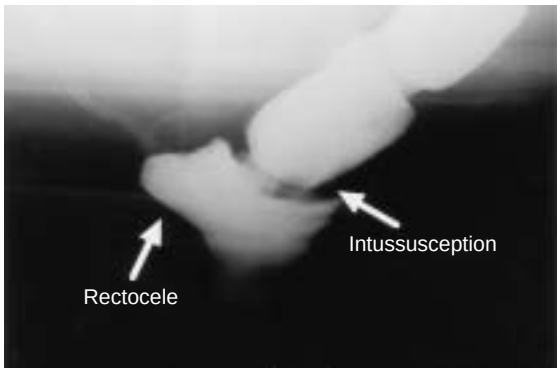

Fig. 4 Rectocele identified on defecography during evacuation of artificial stool

unable to evacuate introduced artificial stool due to a failure to relax pelvic floor muscles. Morphological abnormalities such as rectal prolapse, rectocele, and endorectal intussusception, and the presence of paradoxical contraction of the pelvic floor muscles during attempted defecation (anismus) can be visualized with defecography (Fig. 4). Dynamic MRI imaging and scintigraphic defecography are also methods available for assessment of evacuation.[7)]

7. Evaluation of psychological condition

Psychological condition not only affects clinical symptoms of impaired defecatory function but also interferes with the results of treatment. Mental support is important in medical treatment, and is essential in patients for whom surgical treatment is considered.[8)]

Conclusion

Diagnosis of impaired defecatory function was described with special reference to physiological tests. Physiological tests are not direct diagnostic tools such as double contrast enema and colonoscopy. Moreover, currently available physiological tests do not completely evaluate anorectal function. In the diagnosis of impaired defecatory function, therefore, accurate and detailed history-taking is most important. It should always be examined whether the results of physiological tests are consistent with the patients' clinical symptoms.

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Surgical Management for Defecation Dysfunction

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Abstract: Typical defecation dysfunction includes difficulty with defecation and fecal incontinence, which cause remarkable deterioration of QOL. When such dysfunction is treated, it is essential to understand the mechanism of normal defecation, as well as the anatomical and physiological characteristics of the anal region. Before operation, manometric study of the anal canal, electromyography, and defecography should be performed to exactly identify the abnormalities. Depending on the results, appropriate surgical procedures should be selected for the individual patient. PPH to treat defecation problems due to mucosal prolapse syndrome, levator myoplasty for rectocele, and sphincteroplasty and postanal repair for fecal incontinence are effective procedures. To treat complete sphincter failure, attempts have been made to construct a neoanal sphincter by transposition of muscles and implantation of prosthetic sphincter devices.

Key words: Defecation dysfunction; Difficulty with defecation; Fecal incontinence; Surgery

Introduction

Typical defecation dysfunction includes difficulties in the act of passing feces or flatus, as well as fecal incontinence. Such dysfunction is symptomatically intolerable for the patient, resulting in a pronounced decline in the quality of life. Despite the seriousness of these conditions, the pathology of defecation dysfunction is not widely understood among the physicians involved in treatment. Because of the sense of shame felt by the patient, as well as indifference among physicians, defecation dysfunction is often overlooked and fails to receive appropriate treatment by specialists. To treat these conditions, it is essential to fully understand the causative disease and the anatomical problems in the perineal region. The pathology and management, particularly surgical therapy, of defecation dysfunction are described in this article.

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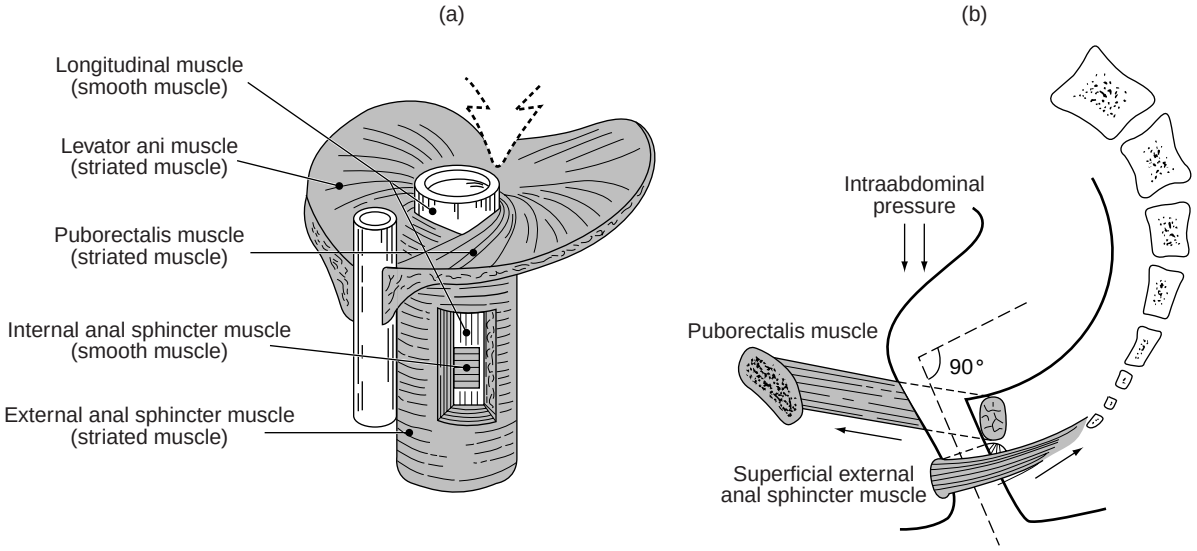

Fig. 1 Anatomy of anal canal (a) and anorectal angle (b)
Source: Teramoto, T. *et al.*: Surgical therapy for fecal incontinence. *Geka Chiryo (Surgical Therapy)* 2000; 83(2): 167.

Mechanism of normal defecation

Defecation can be defined as the act of evacuating feces from the rectum, where fecal material that has been transported through the colon is stored temporarily. Normal defecation occurs at an appropriate time and in an appropriate place. In other words, when sufficient stool or flatus enters the rectum, the pressure inside the rectum increases, and an urge to defecate is generated. The increase in pressure is perceived by pressure receptors present in the rectal wall and transmitted to the central nervous system. Then reflex relaxation of the internal anal sphincter muscle occurs to allow the stool to enter the anal canal. This process, called the anorectal reflex, occurs involuntarily.

Whether the material that has moved into the anal canal is stool or flatus is perceived via somatic nerves. If the situation permits defecation, both the levator ani muscle and the external sphincter dilate in conjunction with the voluntary act of straining, and defecation is accomplished. If the situation is inappropriate, the external sphincter is contracted volitionally to send the fecal material back into the rectum. Accordingly, if the anorectal reflex is impaired, the urge to defecate is not evoked, and the internal sphincter fails to relax. Consequently, feces cannot pass through the anal canal. In some cases, the levator ani muscle and the external sphincter fail to dilate or even conversely contract at the time of straining. This contraction is called a paradoxical contraction. If it occurs, stool can never pass through the anus, however strongly the subject strains. If contraction of the external sphincter is inappropriate, fecal continence can be lost, leading to leakage of stool through the anus before the subject is ready to defecate on the toilet.

Anatomic features of the anal region[1)]

The circular muscle in the wall of the anal canal is double-layered (Fig. 1a). The internal layer is called the internal anal sphincter, which is an involuntary muscle innervated by the autonomic nervous system. The outer layer consists of the levator ani muscle, which is a voluntary muscle that wraps around the internal sphincter in the shape of a funnel and is innervated by somatic nerves, the puborectalis

muscle that forms the lower part of levator ani; and the external anal sphincter, which is another voluntary muscle. Consequently, anorectal function is dependent on the interaction between the autonomic and somatic nervous systems. This means that anal function is dependent on unique anatomical characteristics when compared with the rest of the digestive tract.

The internal sphincter is contracted at rest. When gas or stool reaches the ampulla of the rectum, reflex relaxation of the internal sphincter occurs. In the case of the external sphincter, electromyograms can record action potentials even at rest. This muscle is also tireless and is capable of maintaining its tone for a long period. Both of the sphincter muscles differ from other skeletal muscles in these characteristics, which substantiates the concept that the sphincters are responsible for maintaining closure of the anal canal in an active fashion. In addition, the puborectalis muscle pulls the upper end of the anal canal forward, while the superficial external sphincter pulls the lower segment of the anal canal backward, forming an angle of about 90 degrees between the axis of the anal canal and that of the rectum. This anorectal angle is designed to physically prevent involuntary leakage of stool on any occasion other than defecation, because the rectal wall compresses the anal canal when the intraabdominal pressure increases (Fig. 1b).

Normal defecation is maintained by elaborate collaboration between the various mechanisms described above. If any of them becomes impaired, defecation is functionally impeded.

Surgically correctable pathological conditions causing defecation dysfunction

Diseases associated with defecation dysfunction include rectal mucosal prolapse syndrome, rectocele, solitary ulcer of the rectum, perineal descent syndrome, complete rectal prolapse, and fecal incontinence. Some of these conditions occur concurrently, suggesting the existence of a common etiology.

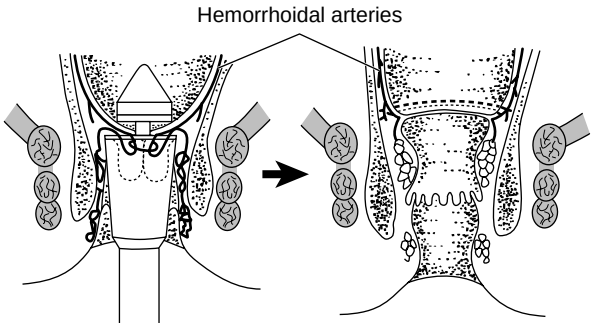

Fig. 2 Excision of the rectal mucosa with a surgical instrument
Use of this instrument allows excision of the redundant mucosa as a mucosal tube and end-to-end anastomosis of the cut ends.

When excessive straining is repeated during defecation attempts for some reason, it results in prolapse of the rectal mucosa, solitary rectal ulcer, or rectocele, leading to aggravation of difficulty with defecation. Once this vicious cycle is established, vigorous straining is repeated to facilitate defecation, leading to perineal descent. This results in the nerves innervating the anus and rectum becoming stretched and injured, resulting in neuropathy and damage to the musculature of the pelvic floor. Eventually, rectal prolapse and fecal incontinence may arise from such secondary injury.[2)]

The pathology of defecation dysfunction can be easily diagnosed by fluoroscopy with injection of barium into the rectum. The movements of defecation can be reproduced while the bolus of barium in the rectum is eliminated in the same way as feces.

Surgical management for difficulty with defecation

In rectal mucosal prolapse syndrome, the mucosa of the anterior wall of the rectum becomes redundant and obstructs the anal canal, preventing the passage of stool. The redundant mucosa of the anterior rectal wall is excised via a transanal approach, and the wound is closed with sutures. Attempts have

been made recently to treat this syndrome by a simple procedure using an instrument that removes a mucosal tube including the redundant mucosa and anastomoses the cut ends. This procedure is called PPH[3] (Fig. 2).

Rectocele is a condition in which the anterior wall of the rectum is protrudes into the posterior wall of the vagina. Stool enters the cele during straining at the time of defecation and accumulates, resulting in incomplete evacuation of the rectum. To treat this, transverse perineotomy is made between the rectum and the posterior wall of the vagina. Through the incision, the rectum and the posterior wall of the vagina are divided from each other bluntly and widely up to the upper margin of the cele, exposing the bilateral limbs of puborectalis muscle. The anterior wall of the rectum is reinforced through taking up slack by gathering the bilateral limbs of puborectalis muscle with stitches. This procedure is called anterior levator myoplasty and is reported to be the most effective.

In complete rectal prolapse, the full thickness of the rectal wall turns inside out and comes down the anal canal to be extruded through the anus. Prolapse of the rectum can be corrected in two ways. In one method, the transabdominal approach is used to raise and fix the prolapsed rectum. In the other method, which is only palliative, the transperineal approach is used to gather the rectal mucosa with sutures and to strengthen the muscles of the pelvic floor. Technical details of these procedures are not described in this article.

The surgical therapy for diseases associated with difficulty in defecation was described above. Even if a pathological condition is repaired surgically, however, recurrence is unavoidable if straining at defecation is repeated. Consequently, it is important to instruct the patient to avoid straining during defecation and to provide drugs to facilitate defecation. The patient must follow the instructions strictly and continue drug therapy over the long term.

Surgical management for fecal incontinence

1. Pathology of fecal incontinence

Fecal incontinence is defined as involuntary passage of the rectal contents, ranging from flatus and watery stools to solid feces. In general, leakage of flatus and watery stools is associated with disorders of the internal sphincter, whereas the leakage of solid feces (which is more serious) occurs when the puborectalis muscle and external sphincter are defective.

Fecal incontinence arises when the defecation dysfunction that was described above persists for many years. In addition, it occurs secondary to defects or disorders of structures in the anorectal region caused by trauma and diseases of the spinal cord. Trauma that leads to loss of the circular structure of the anal canal due to transection of the puborectalis muscle and the internal and external sphincters can cause fecal incontinence, with such trauma including anal surgery for internal hemorrhoids and anal fistula, obstetric perineal laceration, and traffic accidents.

In general, leakage of flatus or slight leakage of stool that merely stains the underwear is commonly caused by interruption of the internal sphincter or disorders of the autonomic nervous system. Because medical therapy is often effective for such mild incontinence, surgery is not performed. If the external sphincter, a voluntary muscle, is disrupted by trauma, closure of the anal canal cannot be maintained, giving rise to serious fecal incontinence.

If the pudendal nerves that innervate the puborectalis muscle and the external sphincter, are impaired or injured because of spinal cord disease, persistent defecation dysfunction, and obstetric injury, the anorectal angle becomes obtuse. If so, the anal canal will not remain closed at rest when the intraabdominal pressure rises, leading to fecal incontinence.

2. Surgical therapy

Surgical procedures to treat fecal inconti-

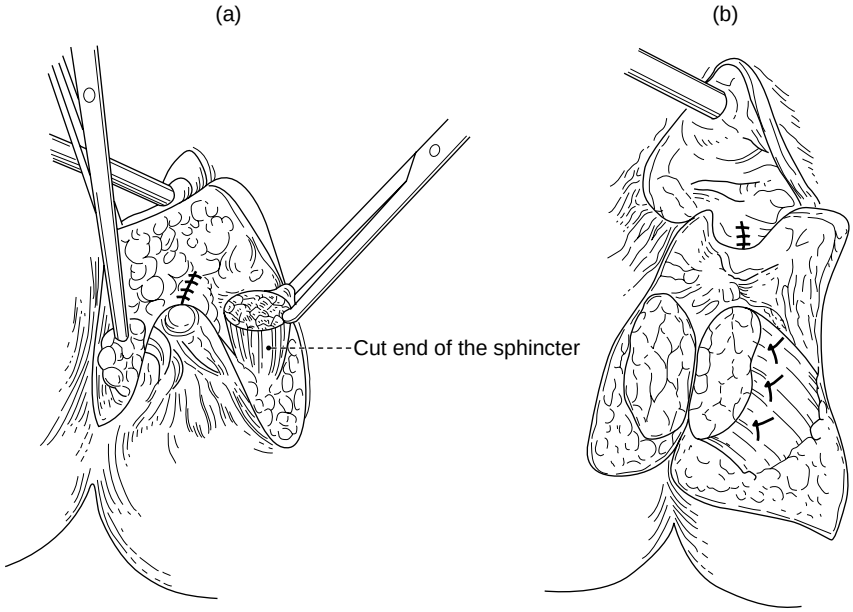

Fig. 3 Sphincter repair
(Cited from "Teramoto, T. *et al.*: Surgical therapy for fecal incontinence. *Shujutsu (Surgical operation)* 1994; 48 (10): 1641–1642" with modification)

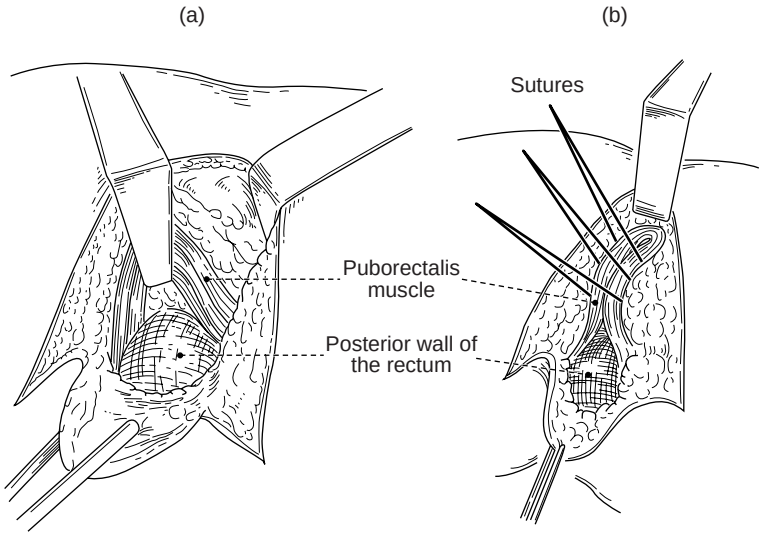

Fig. 4 Post-anal repair
Source: Teramoto, T. *et al.*: Surgical therapy for fecal incontinence. *Shujutsu (Surgical operation)* 1994; 48 (10): 1644.

nence due to the pathological conditions described above include sphincter repair to restore the circular structure of the sphincter muscles and procedures to restore an acute anorectal angle by gathering the puborectalis muscle with sutures behind the rectum.

(1) Sphincter repair

If the sphincter has been cut by trauma, for example, and the cut ends have retracted into scar tissue, the tissue containing the cut ends is divided and mobilized *en bloc* (Fig. 3a). Then the cut ends of both internal and external sphincters are anastomosed *en bloc* to the opposing cut ends with sutures (Fig. 3b). The

wound is closed with sutures primarily. To prevent bacterial contamination of the wound, defecation is not allowed for one week after the operation, so nothing is allowed by mouth and the patient is maintained on total parenteral nutrition. If these measures are taken, a temporary colostomy is unnecessary.

(2) Post-anal repair[4)]

This is a surgical procedure that aims to produce an acute anorectal angle. With the patient lying in the jackknife position, a inverse V-shaped incision starting from 1 cm posterior to the 6 o'clock position on the anal verge is made. The skin and subcutaneous tissue are divided up to the insertion of the external anal sphincter muscle. Then the external and internal sphincters are divided precisely to expose the puborectalis muscle and the levator ani muscle (Fig. 4a). The puborectalis muscle forming the lower end of levator ani is tightened by folding it with sutures behind the rectum to move the rectum forward and thus produce an acute anorectal angle (Fig. 4b). Then the skin incision is closed by a V-Y plasty to avoid cutaneous tension.

(3) Construction of a neoanal sphincter

When surgical procedures to repair the injured sphincter and produce an acute anorectal angle failed to restore continence, or the ability of the sphincters to maintain continence was completely abolished, a permanent colonostomy was once mandatory. However, various surgical procedures to construct a neoanal sphincter have recently been developed. One involves transposition of the gracilis muscle, with which the anal canal is encircled to replace the defective sphincter. Subsequently, contraction of the transplanted muscle is maintained with continuous electric stimulation and this neoanal sphincter permits defecation by discontinuation of the stimulation. Another method involves transplantation of the gluteal muscles, into which the pudendal nerves have been implanted, around the anal canal. The third method involves implantation of a prosthetic valve to replace the defective sphincter. Such procedures have mainly been reported to be successful in Europe and the United States.[5)] In Japan, these new surgical procedures have only been used at a few institutions. If the construction of a neoanal sphincter becomes more common, many unhappy patients will be relieved.

Conclusion

The pathology of difficulties and disorders of defecation that cause fecal incontinence was described along with surgical management for these conditions.

It is important for surgeons and other medical workers to treat defecation dysfunction after making an effort to ensure that the patient fully understands the pathology and undergoes treatment with knowledge. In order to perform surgery and obtain satisfactory results, the pertinent surgical procedure should be determined for each patient after thoroughly studying the pathology preoperatively by manometric study, assessing defecation dynamics by defecography, and performing electromyography. Also, postoperative defecation should be strictly regulated to prevent recurrence.

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Dysfunction in Defecation and Its Treatment after Rectal Excision

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Abstract: Various types of dysfunction in defecation are known to develop after low anterior resection for/in the treatment of rectal cancer. In particular, the lower the level of anastomosis, the more serious the disturbance. This disturbance is characterized by a variable frequency of defecation and urgency. To improve this condition, colonic J-pouch anal anastomosis was reported as an option. In this technique, a colonic J-pouch was constructed and anastomosis was formed with the anus to restore stool reservoir function. This technique has been performed since 1988 at our institution. It was observed that approximately 3 years after the operation stool frequency was significantly decreased, the development of urgency was reduced, and the defecation function was improved, compared with straight coloanal anastomosis. This improvement in the function of defecation appeared to be largely influenced by both an increase (approximately twice) in the capacity and the compliance of the colonic pouch. Since these results were not derived from randomized trials, the published results of randomized trials were investigated, and are also discussed below.

Key words: Coloanal anastomosis; Colonic J-pouch anal anastomosis; Colonic coloplasty

Introduction

It is known that sexual dysfunction, dysuria or dysfunction in defecation develop after rectal excision for the treatment of rectal cancer. Among these, sexual dysfunction and dysuria result from resection of the sympathetic or parasympathetic nerve, hypogastric nerve, pelvic nerve or pelvic plexus, accompanying the dissection of lymph nodes anterior to the abdominal aorta or pelvic lymph nodes. On the other hand, dysfunction in defecation is considered to be an indication of the improvement in surgical techniques. Namely, anastomosis has become possible by using autosuturing devices even at a relatively low level, to avoid the need

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The Japanese text is a transcript of a lecture originally aired on November 9, 2001, by the Nihon Shortwave Broadcasting Co., Ltd., in its regular program "Special Course in Medicine".

for a permanent artificial anus. Moreover, coloanal anastomosis has been performed to construct an anastomosis with the lower anal canal.[1] However, it has been recognized that the level of anastomosis is proportionally related to the frequency of dysfunction in defecation, with a lower level corresponding to a higher frequency. It has been recognized that urgency or a high stool frequency increases after surgery and anomalous conditions such as unstable defecation function develop.

Nicholls *et al.* have suggested that the main cause of dysfunction in defecation is most likely to be the lack of reservoir function in the colonic "neorectum", in some patients.[2] Lazorthes *et al.* and Parc *et al.* published reports in 1986[3,4] on coloanal anastomosis by construction of a colonic J-pouch that forms an anastomosis with the anus, in order to overcome this dysfunction. Post-operative favorable results were also reported. At our institution, we have performed this colonic J-pouch anal anastomosis (colonic J-pouch, and so forth) under specific conditions since 1988. We will report these postoperative results and intend to introduce the results of published data from randomized trials in a comparison with straight coloanal anastomosis.

The Results of Colonic J-Pouch Anal Anastomosis in Our Institution

Straight coloanal anastomosis is the name of the technique in which there is a direct anastomosis with the anus without a reservoir function. When comparing the mean daily stool frequency in colonic J-pouch cases, the daily stool frequency is significantly less than for straight coloanal anastomosis cases up to one year after surgery ($p<0.01$). A smaller difference was found around 3 years after surgery ($p<0.05$) and there were no significant differences 5 years after surgery and onward (Fig. 1). Moreover, with rectoanal manometry (neorectoanal manometry), the test items that showed an inverse correlation with daily stool

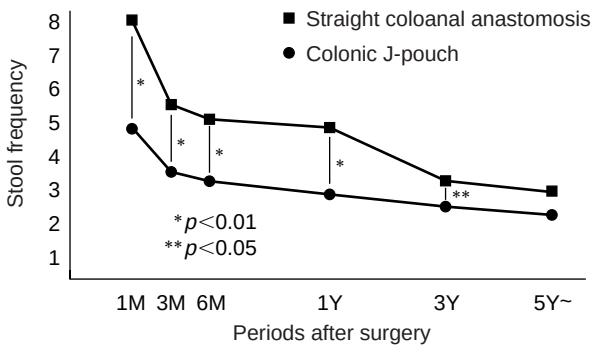

Fig. 1 Time course of daily stool frequency

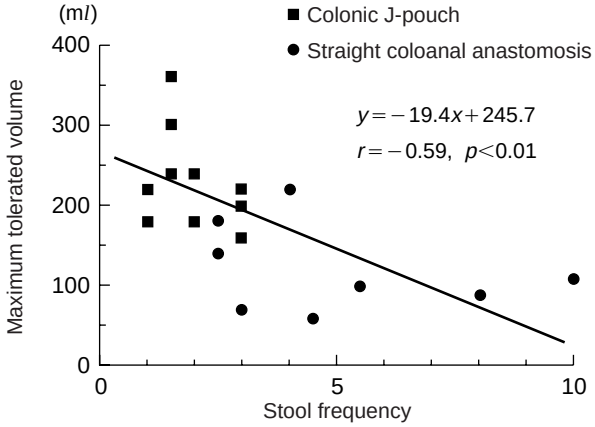

Fig. 2 The relationship of daily stool frequency and maximum tolerated volume (MTV)

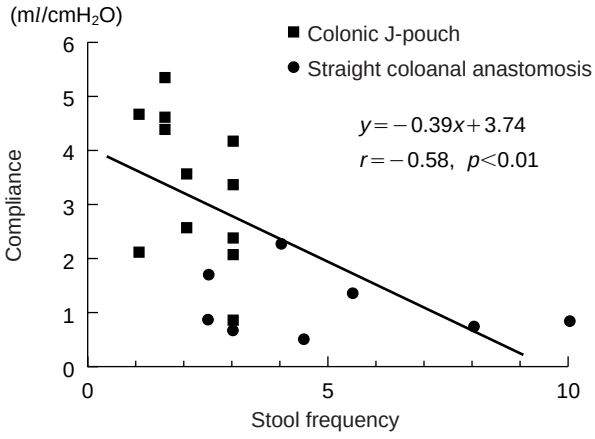

Fig. 3 The relationship of daily stool frequency and compliance

Table 1 Comparison of Rectoanal Manometry (after 1 year)

	Colonic J-pouch ($n=15$)	Straight coloanal anastomosis ($n=8$)	p
ACL (cm)	3.5 ± 1.0	3.3 ± 0.5	NS
MRP (cmH_2O)	50.1 ± 23.4	59.7 ± 21.0	NS
MSP (cmH_2O)	142.8 ± 60.8	138.7 ± 30.6	NS

ACL; anal canal length, MRP; maximum resting pressure, MSP; maximum squeeze pressure

Table 2 Comparison of Rectoanal Manometry (after 1 year)

	Colonic J-pouch ($n=13$)	Straight coloanal anastomosis ($n=8$)	p
MTV(ml)	221.5 ± 55.1	121.3 ± 55.4	<0.001
MTP (cmH_2O)	77.9 ± 33.4	101.2 ± 22.7	NS
ThV(ml)	154.6 ± 54.3	82.9 ± 49.2	<0.01
ThP(cmH_2O)	46.5 ± 19.7	69.8 ± 16.4	<0.02
Comp (ml/cmH_2O)	3.3 ± 1.3	1.2 ± 0.6	<0.001

MTV; maximum tolerated volume, MTP; maximum tolerated pressure, ThV; threshold volume, ThP; threshold pressure, Comp; compliance

frequency were maximum tolerated volume (Fig. 2) and compliance (Fig. 3) of colonic pouch ($p<0.01$). This appears to indicate a correlation between increased colonic pouch volume, or the ease of expansion of the colonic pouch under applied pressure, a lower daily stool frequency. On the other hand, in a comparison of colonic J-pouch and straight coloanal anastomosis at one year after surgery when defecation function becomes stable, no differences were found in anal canal length (ACL), maximum resting pressure (MRP, a test to assess the function of the internal anal sphincter) and maximum squeeze pressure (MSP, a test to assess the function of the external anal sphincter) (Table 1). Maximum tolerated volume (MTV), threshold volume (ThV) and compliance (Comp) were significantly higher for the colonic J-pouch patients (Table 2). In colonic J-pouch cases, MTV, maximum tolerated pressure (MTP), ThV, ThP and Comp showed no significant differences between 1 year after surgery and 3 years or more after surgery (Table 3). Moreover, the symptom of urgency that was problematic in straight coloanal cases was rarely observed in colonic J-pouch cases.

Table 3 Comparison of Rectoanal Manometry According to the Years after Surgery (Colonic J-pouch)

	1 year after surgery ($n=13$)	3 years or more after surgery ($n=11$)	p
MTV(ml)	221.5 ± 55.1	201.8 ± 73.5	NS
MTP (cmH_2O)	77.9 ± 33.4	68.7 ± 13.9	NS
ThV(ml)	154.6 ± 54.3	156.0 ± 63.1	NS
ThP(cmH_2O)	46.5 ± 19.7	45.8 ± 16.5	NS
Comp (ml/cmH_2O)	3.3 ± 1.3	3.2 ± 1.5	NS

According to the results mentioned above, compared with straight coloanal anastomosis cases, it was shown that colonic J-pouch significantly reduced the stool frequency until approximately 3 years after surgery, with decreased development of symptoms like urgency, and an improvement in defecation functions. This improvement in defecation function seemed to be largely the result of an increase in volume (approximately twice) due to the pouch construction and an increase in compliance.

The Results of Randomized Trials

Since the results of our institution are not based on enough cases and they are not derived from randomized trials, we intend to refer to the results of the discussion on published randomized trial data. The results below are from a time point one year after surgery when the defecation function becomes stable.

Ortiz *et al.* have compared the colonic J-pouch of 10 cm in length with straight anastomosis and found a large number of cases with

Table 4 Comparison from Randomized Trial (after 1 year)

Reporter	Colonic J-pouch	Number of patients	Daily stool frequency	Stool frequency 3 times/day and fewer	Normal sphincter function	Urgency	Maximum tolerance volume (m*l*)
Ortiz, H. *et al.*[5]	(−)	15	NS	4	3	9	149
	(+)	15	NS	10 *	6	6	335 *
Seow-Choen, F. *et al.*[6]	(−)	19	2	14	14	4	NS
	(+)	20	2	18 *	19 *	2	NS
Hallböök, O. *et al.*[6]	(−)	47	3.5	NS	NS	15	NS
	(+)	42	2.0 *	NS	NS	2 *	NS
Lazorthes, F.*et al.*[8]	(−)	16	5.0	5	14	3	NS
	(+)	15	2.5 *	13 *	15	2	NS

NS: not stated, $*p<0.05$

Table 5 Comparison from Randomized Trial (pouch volume)

Reporter	Pouch volume (cm)	Number of patients	Anastomosis (cm)	Clinical evaluation	Maximum tolerance volume (m*l*)	Compliance (m*l*/cmH_2O)
Hida, J. *et al.*[9]	5	20	4.5	NS	99	4.5
	10	20	4.5		130 *	6.4 *
Lazorthes, F. *et al.*[9]	6	23	2.5	NS	—	—
	10	24	2.3		—	—

NS: not significant, $*p<0.005$

daily stool frequency of three times or less and a significant difference in MTV.[5] Moreover, Seow-Choen *et al.*, who examined the colonic J-pouch of 8 cm in length, have found a large number of cases with daily stool frequency of three times or less and significant difference in normal sphincter function.[6] Hallböök *et al.* have found a significant difference of lower daily stool frequency, lower frequency of urgency symptom, and lower frequency of leakage with a colonic J-pouch of 6–8 cm in length.[7] On the other hand, Lazorthes *et al.*, who examined a colonic J-pouch of 5 cm in length, have found a significant difference in lower daily stool frequency and more cases with daily stool frequency of three times or less (Table 4).[8]

Similar to the above-mentioned cases, various authors have reported significant improvement in defecation function in every case, even at different lengths of the colonic J-pouch. Some results have been obtained from randomized trials. In summary, it appears that (1) the volume of the colonic J-pouch is approximately twice that of straight coloanal anastomosis, (2) construction of the colonic J-pouch improves anal sphincter function, and reduces daily stool frequency and frequency of the development of urgency, (3) this improvement is particularly evident until one year after surgery.

Therefore the length of the colonic J-pouch constructed seems to be an important consideration. Hida *et al.* reported that there was no difference in the clinical assessment of a 10 cm colonic J-pouch when compared with a 5 cm colonic J-pouch but MTV and Comp were

significantly higher for a 10 cm.[9] On the other hand, Lazorthes *et al.* compared a colonic J-pouch of 6 cm in length with that of 10 cm in length and reported that clinical assessment showed no differences in the stool frequency, urgency, anal sphincter function and other parameters (Table 5).[10] It has conversely been shown that a longer colonic J-pouch results in dyschezia in some cases. Thus it seems that the optimum length or optimum volume requires further investigation through research.

Future Prospects

This technique of anastomosis with the anus by constructing a colonic J-pouch with rectal ampulla function seems to have been standardized globally because of the postoperative favorable results. In 2000, Fazio *et al.* reported a new surgical procedure instead of this colonic J-pouch method.[11] After resection of the rectum up to the anal canal, an 8-cm to 10-cm colotomy is made between the tenia in the proximal colon. Then the longitudinal opening is closed in a transverse fashion. This procedure increases the capacity of the colonic lumen. Theoretically it is similar to strictureplasty procedure for the intestinal stricture and this kind of operation is called "colonic coloplasty." In the same institution, approximately the same results have been obtained from a comparison of the colonic J-pouch anal anastomosis and colonic coloplasty.[12] Moreover, at the ASCRS held in Chicago in June 2002, Fürst *et al.* reported similar results from a prospective randomized pilot study.[13] Therefore, it appears that this colonic coloplasty procedure may take the place of the colonic J-pouch as a new simple, inexpensive surgery in the future. Further examination at other institutions should be performed.

Conclusions

As mentioned above: As a technique for the treatment of carcinoma of the lower rectum, to avoid construction of a permanent artificial anus, extremely low level anastomosis has been performed. As a result, the post-operative complication of dysfunction in defecation has attracted new attention. Construction of a colonic J-pouch was developed as a surgical procedure to improve the dysfunction in defecation and produced favorable post-operative outcomes. However, improvements are still needed because all of the problems have not been resolved. Therefore, further efforts by surgeons toward the development of better techniques to enhance defecation function are required.

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Changes in Measures against Infectious Diseases in Japan and Proposals for the Future

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Abstract: The new Infectious Diseases Control Law was implemented in April 1999 to thoroughly revamp measures against infectious diseases in Japan. The enactment of this law represents the final stage of transition from the previous system, which was characterized by legislation pertaining to individual infectious diseases, to a system based on a unified, comprehensive law for the control of these diseases. As a result of these changes, measures against infectious diseases in Japan are now governed by five laws: the Infectious Diseases Control Law, Tuberculosis Prevention Law, Rabies Prevention Law, Preventive Vaccination Law, and Quarantine Law. Under the Infectious Diseases Control Law, infectious diseases stipulated as subject to administrative management are classified as Type I (hospitalization in principle), Type II (hospitalization depending on the degree of infectiousness), Type III (restrictions on work), and Type IV (surveillance alone). The designation "infectious disease surveillance" pertains to a group of 44 diseases that require a survey with a complete count to be taken and a group of 28 diseases amenable to fixed-point survey. In addition, a computer-based system has been established to provide information on the current status of 72 infectious diseases in Japan.

Key words: Emerging and re-emerging infectious diseases; Law; Human rights; Medical care system; Surveillance

Introduction

From the 1960s to 1970s, the focus of concern regarding health issues shifted from infectious diseases to chronic diseases like cancer and circulatory disease, similar to the trend in various other parts of the world, particularly the developed countries.[1)] In Japan, cholera, a classic, representative infectious disease, decreased markedly because of improved hygiene and

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advances in medicine and medical treatment. Currently, only several dozen people contract cholera annually, and there are very few deaths from this disease in Japan.[2] Whereas tuberculosis had ranked first among the causes of death in Japan until 1950, the number of patients and number of deaths declined sharply after it was surpassed by cerebrovascular disease the following year. Emerging infectious diseases, such as AIDS and Ebola hemorrhagic fever, and re-emerging infectious diseases, such as drug-resistant tuberculosis and malaria, have been encountered recently.[3] In terms of the quality of measures being taken against infectious diseases, questions have arisen as to how the public welfare system should function while maintaining a commitment to fairness, human dignity, and individual rights.

Laws concerning Measures against Infectious Diseases and Related Problems in Japan

1. One hundred years of the Communicable Diseases Prevention Law

The starting point for infectious disease control in modern Japan was the Communicable Diseases Prevention Law enacted in 1897.[4] This law was promulgated by the Meiji Government after Japan's former Constitution was ratified in 1889. This law was the first to stipulate measures against infectious diseases in statutory form. It contained certain regulations that were in conflict with basic human rights as understood today, such that compulsory hospitalization was possible simply when ordered by a municipal mayor. The eight infectious diseases covered at the time of the law's implementation had all occurred in the form of repeated large or small epidemics and included cholera, dysentery, typhoid, variola, epidemic typhus, scarlet fever, diphtheria, and plague. Municipal governments were responsible for implementing control measures, and elements of social defense were prominent in regulations concerning the specific implementation of measures. It was natural to attempt to protect citizens from the threat of infectious diseases by means of this law in the late 1800s, when the number of cholera patients sometimes exceeded 100,000 per year.

The Communicable Diseases Prevention Law remained in effect for a very long period, playing a central regulatory role in the control of infectious diseases in Japan. Its basic framework was maintained even after the current Japanese constitution was established in 1946, after the end of World War II.

2. Law on measures of disease control and health care services

Infectious disease control in Japan has been developed on the basis of laws that focus on particular infectious diseases (e.g., the Venereal Disease Prevention Law and Tuberculosis Control Law) and laws on comprehensive measures designed for particular health care services, e.g., the Preventive Vaccination Law and the Quarantine Law (Table 1). Because at the time of their enactment these laws were aimed at disease- and service-based measures and reflected the current levels of public health, medicine, and medical treatment, as well as the general climate of human rights, there was no coordination among them. In addition, critics pointed out that infectious diseases designated by law might be perceived as dangerous diseases, and might therefore lead to discrimination and prejudice against those with such diseases.[5]

3. Change in measures against infectious diseases in Japan

In July 1996, the outbreak of enterohemorrhagic *Escherichia coli* O157 infection occurred in Sakai, Osaka, infecting several thousand people.[6] About the same time, a movement to amend the Communicable Diseases Prevention Law with the aim of providing new measures to counter infectious diseases reached fruition, and the Japanese government began to take action.

Table 1 Major Historical Japanese Laws Related to Measures against Infectious Diseases Leading to the Enactment of the Infectious Diseases Control Law

Laws focusing on measures against a particular infectious disease	
• Communicable Diseases Prevention Law	(enacted in 1897, abolished in 1999)
• Trachoma Prevention Law	(enacted in 1919, abolished in 1983)
• Parasitosis Prevention Law	(enacted in 1931, abolished in 1994)
• Venereal Disease Prevention Law	(enacted in 1948, abolished in 1999)
• Tuberculosis Control Law	(enacted in 1951)
• Leprosy Prevention Law	(enacted in 1953, abolished in 1996)
• Law concerning Prevention of Acquired Immune Deficiency Syndrome	(enacted in 1989, abolished in 1999)
Law focusing on measures against sensitivity	
• Preventive Vaccination Law	(enacted in 1948)
Law focusing on prevention of invasion of infectious diseases from outside the country	
• Quarantine Law	(enacted in 1951)

Note: The Rabies Prevention Law (enacted in 1950) has a complex nature involving the above three categories.

Initially, the Ministry of Health and Welfare (currently the Ministry of Health, Labor, and Welfare) set up a subcommittee to review fundamental issues within the Council on Public Health, an advisory body to the Minister concerning general public health measures. The subcommittee consisted of representatives from the fields of experimental medicine, clinical medicine, law, and journalism. The subcommittee published an interim report in June 1997, and submitted its final report, entitled "Measures against infectious diseases in the modern era," to the Council on Public Health in December of the same year.[7] In addition, after discussion by the Council on Public Health, a bill on the Law concerning Prevention of Infectious Diseases and Medical Care for Patients Suffering from Infectious Diseases (Infectious Diseases Control Law) that sought to annul three of the existing laws, i.e., the Communicable Diseases Prevention Law, the Law concerning Prevention of Acquired Immune Deficiency Syndrome (the so-called AIDS Prevention Law), and the Venereal Disease Prevention Law, was placed before the National Diet in March 1997. After the addition of various amendments, the law was enacted in September 1998 and took effect in April 1999.[8]

New Measures against Infectious Diseases

1. Background of the enactment of the Infectious Diseases Control Law

The presence of emerging and/or re-emerging infectious diseases was not the only factor underlying the enactment of the Infectious Diseases Control Law.[9] Improvements in hygiene represented by a better sewer system and people's expanded awareness of health brought about a sharp decline in the incidence of water-borne infections. On the other hand, concentration of the population in large cities and tightly insulated houses equipped with air conditioners heightened the risk of air-borne and droplet infections. Another issue was the high incidence of food-mediated infections as well as the increasing scale and spread of such epidemics, which results from joint operations in the areas of food processing and distribution.[10] Another important concern is the frequent use and abuse of antibiotics, causing the emergence of drug-resistant bacteria. Yet another factor in public demand was seeking for better human rights for patients, consistent with the current general trend in society, plus fairness and transparency of administration. Further, with the advent of mass air travel,

Table 2 Classification of Infectious Diseases in Japan

	Nature	Chief measures and actions
Infectious Diseases-Type I	Infectious diseases that carry extremely high risk from a comprehensive point of view including infectiousness and severity of symptoms when contracted	• Hospitalization in principle • Measures upon things such as sterilization • In exceptional cases, measures on buildings or for restricting transit • Every physician who has diagnosed the patient is obligated to report
Infectious Diseases-Type II	Infectious diseases that carry high risk from a comprehensive point of view including the infectiousness and severity of symptoms when contracted	• Hospitalization according to conditions including presence/absence of pathogen and symptoms • Measures upon things such as sterilization • Every physician who has diagnosed the patient is obligated to report
Infectious Diseases-Type III	Infectious diseases that do not carry particularly high risk from a comprehensive point of view including infectiousness and severity of symptoms when contracted, but that could cause massive outbreak in particular occupational categories	• Restrictions on particular occupations • Measures affecting sterilization, etc. • Every physician who has diagnosed the patient is obligated to report
Infectious Diseases-Type IV	[Amenable to complete-count survey] Infectious disease of Type I, II, or III that does not carry particular risk but needs to be observed for occurrence, and whose incidence is relatively low	• Every physician who has diagnosed the patient is obligated to report
	[Amenable to fixed-point survey] Infectious disease of Type I, II, or III that does not carry particular risk but needs to be observed for occurrence, and whose incidence is relatively high	• Medical institutions in various parts of the country assigned to perform fixed-point surveys should report the case upon diagnosis

more than 16,000,000 Japanese go abroad each year. Air travelers are able to return to Japan from almost anywhere on earth within less than 30 hours, creating the problem of infected individuals entering the country during the incubation period of disease.[11)]

2. Classification of infectious diseases

The primary purpose of the current reconsideration of measures against infectious diseases is to amend the fundamental law on which control measures have been formulated. However, the supposition that measures to control a number of infectious diseases which are diverse in their epidemiological or clinical aspects can be dealt by a single law has been challenged. In response, classification of infectious diseases has been attempted. First, all infectious diseases that necessitate control measures to be taken by the Government were listed and assessed in terms of infectiousness, route of infection, seriousness of symptoms and conditions, and presence/absence of therapeutic or prophylactic methods. On the basis of the results of this assessment, infectious diseases were classified into four types, from the aspects of the propriety of (1) hospitalization, (2) restrictions on working, and (3) surveillance (Tables 2 and 3). "Infected individuals" (patients in a broad sense) include suspected patients, symptomatic pathogen carriers (patients), and asymptomatic pathogen carriers. These groups often require different actions. To cope with this situation, differences in policies for handling patients were introduced according to the type of infectious disease (Table 4). Infectious Diseases-Type IV were further divided into a group subject to complete-count survey and a group designated for fixed-point survey.

Table 3 Classified Infectious Diseases

	Classified infectious diseases	
Infectious Diseases-Type I	• Ebola hemorrhagic fever • Crimea-Congo hemorrhagic fever • Plague • Marburg disease • Lassa fever	
Infectious Diseases-Type II	• Cholera • Bacterial dysentery • Typhoid • Paratyphoid • Acute poliomyelitis • Diphtheria	
Infectious Disease-Type III	• Infectious disease caused by intestinal hemorrhagic *Escherichia coli*	
Infectious Diseases-Type IV	[Amenable to complete-count survey]	
	• Amebic dysentery	• Anthrax
	• Viral hepatitis	• Trombiculosis
	• Echinococcosis	• Dengue fever
	• Yellow fever	• Japanese spotted fever
	• Parrot disease	• Japanese encephalitis
	• Relapsing fever	• Infant botulism
	• Q fever	• Syphilis
	• Rabies	• Tetanus
	• Cryptosporidiosis	• Infectious disease caused by vancomycin-resistant enterococcus
	• Creutzfeldt-Jakob disease	
	• Fulminant hemolytic streptococcal infection	• Hantavirus pulmonary syndrome
	• Acquired immunodeficiency syndrome (AIDS)	• B virus disease
	• Coccidioidomycosis	• Brucellosis
	• Giardiasis	• Epidemic typhus
	• Hemorrhagic fever with renal syndrome	• Malaria
	• Meningococcal meningitis	• Lyme disease
	• Congenital rubella syndrome	• Legionellosis
	[Amenable to fixed-point survey]	
	• Pharyngoconjunctival fever	• Erythema infectiosum
	• Influenza	• Exanthema subitum
	• Pharyngitis caused by hemorrhagic streptococcus group A	• Pertussis
		• Rubella
	• Infectious gastroenteritis	• Infectious disease caused by penicillin-resistant pneumococcus
	• Acute hemorrhagic conjunctivitis	
	• Acute encephalitis	• Herpangina
	• Chlamydial pneumonia	• Mycoplasma pneumonia
	• Bacterial meningitis	• Measles (excluding adult cases)
	• Varicella	• Aseptic meningitis
	• Chlamydia-caused infectious disease of sexual organ	• Infectious disease caused by methicillin-resistant staphylococcus aureus (MRSA)
	• Herpesvirus-caused infectious disease of sexual organ	• Drug-resistant pseudomonas aeruginosa infection
	• Adult measles	• Epidemic keratoconjunctivitis
	• Condyloma acuminatum	• Epidemic parotitis
	• Hand, foot, and mouth disease	• Gonococcal infection

Table 4 Hospitalization or Restrictions on Work by Legal Mandate According to the Presence/Absence of the Pathogen and Symptoms of Infectious Disease

		Mandated hospitalization	Mandated restrictions on work
Infectious Diseases-Type I	Suspected patients	○	○
	Symptomatic pathogen carriers	○	○
	Asymptomatic pathogen carriers	○	○
Infectious Diseases-Type II	Suspected patients	△*	×
	Symptomatic pathogen carriers	○	○
	Asymptomatic pathogen carriers	×	○
Infectious Diseases-Type III	Suspected patients	×	×
	Symptomatic pathogen carriers	×	○
	Asymptomatic pathogen carriers	×	○
Infectious Diseases-Type IV	Suspected patients	×	×
	Symptomatic pathogen carriers	×	×
	Asymptomatic pathogen carriers	×	×

*Cholera, Bacterial dysentery, Typhoid, and Paratyphoid are amenable to hospitalization by legal mandate, whereas acute Poliomyelitis and Diphtheria are not.

The concept of these four types and the assignment of each infectious disease to a category are unique to Japan, and are open to critical comments from other countries. In supplementary Article 2 of the Infectious Diseases Control Law, it is stipulated that review of the classification of infectious diseases should be repeated every 5 years, in addition to an overall review of the law 5 years after its implementation. Discussion among health professionals is therefore important.

It is possible that new infectious diseases (pathogens) may develop or that existing infectious diseases (pathogens) may undergo changes in infectiousness, pathogenicity, and drug sensitivity. In that case, rapid action, even if provisional, must be taken to prevent the infection from spreading. Therefore, endorsement of the necessary formalities should be provided for by law. Two systems are incorporated in the Infectious Diseases Control Law for this purpose.

(1) Under the new infectious diseases control system, the government can designate a new infectious disease as such and take legal action on its own authority when it is necessary to implement rapid prevention of the spread of infection, even if the pathogen has not been identified. Since this system is executed by government ordinance rather than law, it should be applied under extremely limited conditions. The diseases subject to the ordinance are those restricted to the same or higher levels of infectiousness and seriousness as those of Infectious Diseases-Type I.

(2) Through the designated infectious disease system, the government designates an existing infectious disease as one that requires different control measures from those specified for the current classification of the disease because of altered pathogenicity owing to mutation or for other reasons (such as when a Type IV infectious disease observed for its epidemic trend becomes virulent enough to

require hospitalization by law). The government is allowed to implement necessary measures within a one-year time period.

A new infectious disease is construed as a designated infectious disease after the pathogen has been identified.[12)]

3. Restructuring of the medical care system

Under the Communicable Diseases Prevention Law, municipal governments have prepared about 10,000 beds nationwide (as of 1996) for legally mandated hospitalization of patients with infectious diseases in order to deal with the 13 diseases subject to the law.[13)] However, in recent years, the number of new patients with these diseases are about 1,500 annually,[14)] and most of the 10,000 beds for infectious diseases are left unused.

In order to restructure the medical care system for patients with infectious diseases under the current Infectious Diseases Control Law, medical care is divided into the following four groups, with three of them assigned to designated medical institutions and one assigned to general medical institutions, according to the type of infectious disease.

(1) Designated medical institutions for specified infectious diseases (about two institutions [about four beds] designated by the Minister of Health, Labor and Welfare) are in charge of the hospitalization of patients with any new infectious disease that is so designated when it is new in humans with its pathogen being unknown and when it is judged to be as dangerous as or more dangerous than Infectious Diseases-Type I.

(2) Class-1 medical institutions for infectious diseases (designated by prefectural governors, one institution per prefecture, about 100 beds) are in charge of hospitalization of patients with Infectious Diseases-Type I.

(3) Class-2 medical institutions for infectious diseases (designated by prefectural governors, few institutions per prefecture, about 2,800 beds) are in charge of hospitalization of patients with Infectious Diseases-Type II.

(4) Infectious Diseases-Types III and IV are dealt with by general medical institutions.[15)]

This three-tiered designation of medical institutions is not only aimed at segregating the medical treatment of Infectious Diseases-Type I and II but is also expected to serve as a base for training those who will assume responsibility for implementing measures against infectious diseases throughout the country in the 21st century and for the accumulation of knowledge and experience.

4. Considerations regarding the human rights of patients with infectious disease

A patient with a designated infectious disease may receive medical treatment based on the type of infectious disease and the kind of restrictions placed on behavior, for example, mandated hospitalization or restrictions on work. If the prefectural health administration requests legally mandated hospitalization, it is mandatory that proper formalities regarding hospitalization is taken on behalf of the patient, to avoid arbitrary actions by the administrative authority. This is important because such hospitalization may be tantamount to physical restraint in some situations.

The Infectious Diseases Control Law prescribes regulations for securing stepwise formalities based on the spirit and content of the International Covenants on Human Rights (rule B).[16)] Prefectural governments are obligated to recommend hospitalization in writing to patients with Infectious Diseases-Type I or II who are judged to require hospitalization. Compulsory hospitalization by legal mandate is permitted only when the patient does not follow this recommendation. If a patient's admission is legally mandated under recommendation or compulsory admission, the hospital stay is restricted to within 72 hours. If a longer hospital stay is necessary, it requires the approval of a third-party council on the review of infectious diseases (composed of members from both the medical and legal communities).

If further prolongation of the hospital stay is

necessary, approval of the council is required by law for each 10 days of extension. If a claim is submitted by a patient who has been hospitalized under legal mandate for more than 30 days, the Minister of Health, Labor and Welfare is obligated to examine the need for such hospitalization and to notify the patient of the assessment. Medical expenses required for hospitalization under legal mandate in cases of Infectious Diseases-Type I or II are to be borne by the national and prefectural governments, excluding those reimbursed by social insurance. Medical care for patients with Infectious Diseases-Type III and IV, which are not amenable to hospitalization by legal mandate, are to be provided according to contract between the patient and the medical institution, in the same manner as in usual medical care.

Some have criticized this procedure of hospitalization by legal mandate as being too slow for the treatment of, for example, typhoid, while others are of the opinion that cautious, deliberate action needs to be taken. Implementation of this system in the future should be considered on the basis of the actual circumstances.

5. Strengthening of measures against infectious diseases of animal origin

Legal measures against human infectious diseases of animal origin have been limited to those against rabies in dogs through the Rabies Prevention Law.[17] The Infectious Diseases Control Law provides for animal quarantine and animal surveillance as control measures against infectious diseases of animal origin. The animals and infectious diseases amenable to such quarantine and surveillance are to be designated by government ordinance. In the first stage of control measures against infectious diseases of animal origin, the monkey has been designated the subject, with Ebola hemorrhagic fever and Marburg disease the targeted infectious diseases. Meanwhile, the target of the Rabies Prevention Law has been extended to raccoons, cats, skunks, and foxes in addition to dogs, and import quarantine and domestic animal surveillance have been enhanced.

Further considerations based on the current, actual situation in which a wide variety of animals are being imported to Japan as pets are necessary in order to determine whether the subject animals and infectious diseases for quarantine should be extended under the Infectious Disease Control Law.

6. Strengthening the quarantine system

The former quarantine system in Japan targeted three diseases, cholera, plague, and yellow fever, on the basis of the quarantine law in compliance with International Health Regulation (IHR).[18] The quarantine law was revised at the same time as the enactment of the Infectious Diseases Control Law to cover Ebola hemorrhagic fever, Marburg disease, Lassa fever, and Crimean-Congo hemorrhagic fever, in addition to the above three diseases.

Further, the increase in air travel has heightened the risk that infected people would enter Japan during the latent or incubation period of a disease, making quarantine at ports of entry not sufficiently effective. Therefore, regulations aimed at enlisting and expanding the cooperation of quarantine stations and organizations aimed at preventing epidemics, such as health centers, were written into the revised quarantine law. In January 2000, a German tourist who returned to Frankfurt from West Africa developed Lassa fever. Three Japanese passengers were on the same flight as the German patient. The quarantine station followed these Japanese passengers in cooperation with public health centers and the National Institute of Infections Diseases, and determined that they had not been infected with Lassa virus.

The revised quarantine law includes regulations to confer on quarantine stations the status of health center for travelers who enter and exit the country, i.e., the provision for those embarking from Japan for consultation and information about the characteristics, routes, and prevention of infectious diseases prevalent in various regions in the world. As a result of

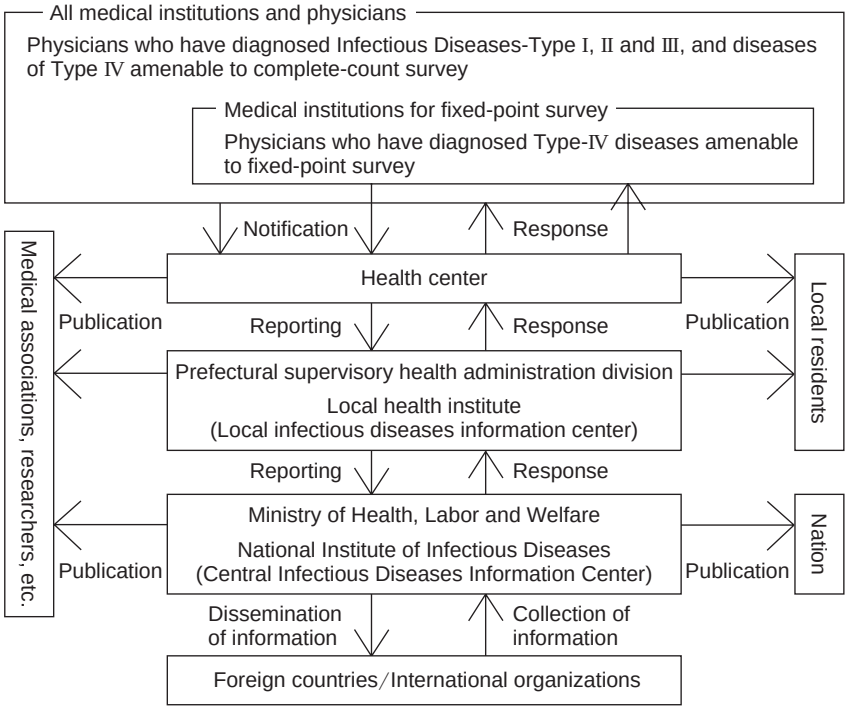

Fig. 1 Infectious diseases surveillance system

these regulations, quarantine stations no longer function simply to check people entering the country.

7. Development of advance measure-based administration

The aspects of both risk management and crisis control are important in providing measures against infectious diseases. Advance measure-based administrative policies including the preparation of manuals that specify control measures for possible cases on the assumption that epidemic outbreaks may occur, rather than devising countermeasures after infections have occurred, are necessary in ordinary times. For this purpose, the Infectious Diseases Control Law places the national government under obligation to publish the basic principles for measures against infectious diseases,[19] and each prefectural government under obligation to map out prevention plans, which are specific manuals of measures against infectious diseases that conform to the actual circumstances of the region.

Future Considerations and Direction of Measures against Infectious Diseases

1. Improvement of the surveillance of infectious disease

According to the Infectious Diseases Control Law, a national surveillance system is to investigate the trends of occurrence of all 72 diseases assigned to the category Infectious Diseases-Type I (5 diseases), Type II (6 diseases), Type III (1 disease), and Type IV (60 diseases).

This law prescribes that every physician who has made a diagnosis of Infectious Disease-Type I, II, or III, and the 33 diseases of Type IV amenable to the complete-count survey should notify the regional health center. In addition, for the 28 diseases of Type IV amenable to the fixed-point survey [distinguishing measles in adults (18 years or older) from that in younger patients], physicians who have made a diag-

nosis in designated institutions for fixed-point survey should provide information to the health center on a weekly (or monthly for some diseases) basis.

This information will be sent from the health center to the prefectural supervisory health administration division and then to the Ministry of Health, Labor and Welfare. Cases will be totaled and analyzed by the National Institute of Infectious Diseases. Results are then published on the Internet at <http://idsc.nih.go.jp>, a site maintained by the National Institute of Infectious Diseases, in the form of the Infectious Diseases Weekly Report (IDWR) (Fig. 1). The data are also available in printed form since November 2000.

Although the infectious diseases surveillance system in Japan has expanded considerably, various issues remain to be discussed and solved. The need for additions to or deletions from the list of 60 diseases included in Infectious Diseases-Type IV and for shifting between the complete-count survey and fixed-point survey should be reanalyzed in 2004, i.e., five years after the implementation of the Infectious Diseases Control Law, when the overall classification of infectious diseases is to be reconsidered. All information collected should be returned to the public in such a way that all citizens can make use of it. Surveillance data should not be monopolized, but should be open to the public, not in the usual form of summaries, but as a database from which personal data are excluded, so that it can be utilized by public health professionals and clinicians engaged in research activities, community health activities, and clinical practice.

2. Provision of appropriate, high-quality medical care

Medical care for infectious diseases has had a history of isolation because of the misunderstanding that it is different from ordinary medical care in terms of infectiousness and high mortality rates, assumptions that arose in the past when no established treatment was available. However, the medical care of infectious diseases should never be considered special. The Infectious Diseases Control Law provides, to the greatest extent possible, regulations aimed at uniting the medical care of infectious diseases with general medical care. Specifically, such regulations are related to the system of designated institutions for infectious diseases, abolition of limitations on the use of hospital beds for infectious disease, reduction of hospital beds to the minimum necessary number, and concomitant use of public funds and insurance for payment of medical expenses, among others. This is the time to evaluate whether the medical care of infectious diseases based on the new policy is well established in this country. In this regard, a great deal is expected from health professionals as well as the Ministry of Health, Labor and Welfare and the prefectural governments.

Conclusion

In April 1999, a new law based on new ideas regarding infectious disease control in Japan was implemented, replacing a system that had continued for more than 100 years. The new system retains the merits of the past system, while adapting effective control measures employed by other countries and by international organizations, to create an original system that is well suited to Japan's needs. It is important that elements of this system is exported from Japan to other parts of the world and that the contents of the system continue to be re-examined.

The threat of infectious diseases can create change beyond our imagination. There is always the risk that failure to take immediate, appropriate measures may jeopardize public health and bring about a threat to the entire human race.[20] Japan must work constantly to improve its control measures and prepare for possible crises while, at the same time, respecting the human rights of patients and others.

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Extragenital Infection with Sexually Transmitted Pathogens

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Abstract: The significant characteristics of STDs are as follows: (1) no spontaneous eradication without medical treatment; (2) an asymptomatic infectious source; and (3) lethal complications arising after a protracted post-infection period. The incidence of extra genital STD infections increases with increased extra genital contact during sex. Both Neisseria gonorrhea and Chlamydia trachomatis infect the pharynx, since the columnar epithelium of the urethra and cervix is similar to that of the pharynx. Because Japanese are a homogenously well-educated, cautious people, the number of cases of gonorrhea has dropped by approximately one-fifth after a large media AIDS campaign conducted in 1985. However, the ratio of 'male gonococcal urethritis contracted via the female pharynx' among total male gonococcal urethritis cases simultaneously increased up to approximately 50%. This trend is due to the fact that fellatio without vaginal intercourse is commercially available in Japan. At present some 30% of both gonococcal male urethritis and female cervicitis cases also have gonococcal pharyngitis. The significant characteristics of gonococcal pharyngitis are (1) a lack of symptoms; (2) difficulty in detecting the gonococcus; and (3) difficulty in eradicating the gonococcus. Regarding (1), patients tend to have no subjective symptoms, e.g. discharge, pain on swallowing, and no redness or discharge can be observed on clinical examinations. Regarding characteristic (2), due to the large number of normal flora in the pharynx, false negative reactions by culture isolation and false positive reactions by Amplicor PCR are frequent in pharyngeal specimens. Regarding (3), after eradicating gonococcus from the urethra and cervix by chemotherapy, the same strain can still be isolated from the pharynx of the same patient.

Key words: Gonococcal pharyngitis; Quinolone-resistant gonococci; Cephem-resistant gonococci; Amplicor PCR

Prevalence of Sexually Transmitted Diseases (STDs) Worldwide

Thanks to the development of antimicrobial agents and vaccines, the control of infectious diseases, which had formerly ranked first among the leading causes of death, became possible during the latter half of the twentieth century.

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Nevertheless, because no vaccines have been developed to inoculate against STDs, and the proportion of infected patients who transmit STDs with subjective symptoms and also seek treatment is low, STDs remain the most poorly controlled of all infectious diseases.

According to information published by the WHO in 1995, 335 million people have STDs that are treatable by chemotherapy and these diseases include gonorrhea, chlamydial infection, syphilis, and trichomoniasis, while the number of infected people including asymptomatic individuals with infections such as herpes simplex virus, human papilloma virus or HIV infection may amount to several billion. In the same year, the World Bank announced that the number of individuals with STDs including AIDS in the 15–49 year-old age group ranked second among all disorders in developing countries, while in the US, 12 million people were reported to be suffering STDs that are treatable with chemotherapy, while 2 million teenagers had STDs.[1)]

HIV can be transmitted in circulating blood by blood contact through anal intercourse, shared needle use for intravenous drug use (IDU) narcotics, and so forth. The importance and degree of prevalence vary considerably depending on the geographical location and socioeconomic conditions. Clarification of these issues has revealed the prevalence and causes of STDs, which vary with race and social settings, and are also related to societal trends as well as of some aspects of human society such as homosexuality and narcotics abuse[2)] which are normally concealed from public notice.

Current estimates indicate the cumulative number of HIV cases in the United States to be approximately 780,000 in 2000; with the number of infected patients notified during the 1981–1992, 1993–1995, and 1996–2000 periods each accounting for approximately one third of the total. Eighty percent of all AIDS cases are male, 61% are blacks and Hispanics, and 85% are people aged between 20–49 years. Reportedly, 46% of cases are homosexual or bisexual men (men who have sex with men = MSM), 25% are intravenous narcotics abusers, and 10% have contracted the infection via heterosexual intercourse. In Africa, in contrast, the male: female ratio of cases is 1 : 1, with an infection rate of as high as 8.8% for the 15–49-year-old age group, AIDS mortality has already resulted in a decrease in the mean life expectancy in this region. This characteristic prevalence of HIV infection is largely attributable to a social environment that encourages multiple sexual partners and a high STD infection rate. The infection rate for the 15–49-year-old age group has been reported to be 0.7% in India, 82% for intravenous drug abusers and 6% for prostitutes in China, and 2.1% for adults in the Caribbean Islands. HIV infection has the highest mortality rate in Africa and ranks fourth worldwide.[3)] There are fewer cases of HIV infection in Japan and the Republic of Korea, and cases attributable to unheated blood products still account for approximately half of all reported cases in Japan. However, as is the case of syphilis, HIV as an STD cannot be eradicated. The treatment of AIDS reportedly costs 100 million yen per annum per patient when covered by national health insurance in Japan; hence the effective control of HIV infection is an urgent task.

STDs are contagious diseases, and each STD patient has a contact who serves as the source of infection and one or more contacts to whom the infection may have been transmitted. STDs are often asymptomatic, and such individuals thus spread the infection without being aware that they are infected. Treatment of the patient alone does not suffice to control STDs, and it is essential to pursue the source of infection and sexual partner(s) and to undertake epidemiological treatment. In the U.S.A. and Europe these duties are undertaken by free STD clinics.

To date, no medical care system for STDs has been developed in Japan despite the volume of antimicrobial agents used in this country being virtually equivalent to one third of total output worldwide, owing in part to the peculiarities of

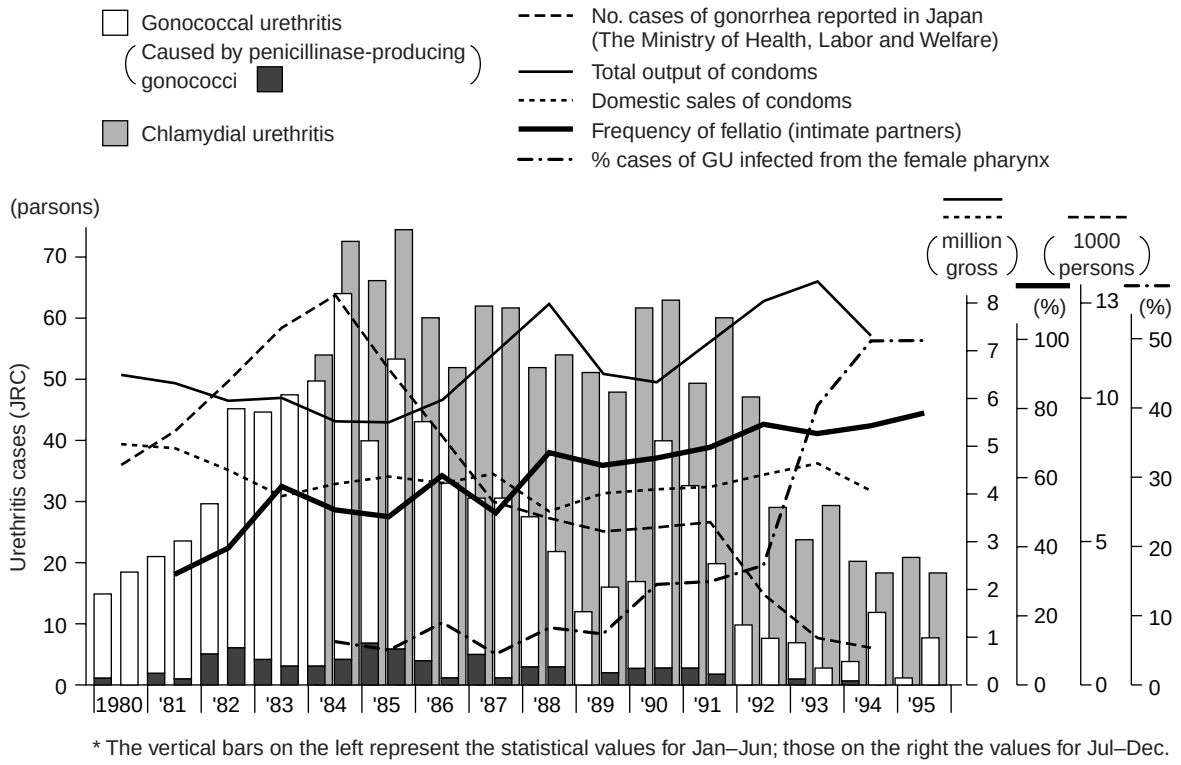

Fig. 1 Annual changes in urethritis cases, incidence of pharyngeal infection at the JRC Medical Center

the nationwide universal health insurance system. The control of STDs in the country is thus not based on epidemiological treatment upon correct diagnosis but on "untargeted mass-dose antimicrobial medication". Even control of condyloma acuminatum and syphilis has generally been achieved via these measures. In Japan, the chlamydial infection rate for young females remains at approximately 5% despite the fact that annual consumption of even a single new quinolone antibiotic is almost "sufficient to cure chlamydial infection in 3.8 million patients". This high infection rate has remained constant since 1985 when the diagnosis of chlamydial infection became possible. It is thus considered ineffective to reduce the prevalence of chlamydial infection using the above method. While extragenital infections with sexually transmitted pathogens such as HIV and syphilis are not uncommon, I would like to review the situation regarding gonorrhea where asymptomatic pharyngeal infection constitutes the source of infection in a majority of cases.

Gonococcal or Chlamydial Pharyngeal Infection

Gonococci and *Chlamydia trachomatis* (CT) normally infect the columnar epithelium of the male urethra and female uterine cervix but also cause an infection in the conjunctiva, pharynx and rectum, the surfaces of which are lined with a similar quality of epithelium. A conjunctival infection with gonococci and CT in newborns caused by birth canal infections have long been known as neonatal acute purulent conjunctivitis[4] and neonatal inclusion conjunctivitis.[5] Meningococci, which are gram-negative cocci similar to gonococci, are occasionally isolated from the throat even in the absence of

Table 1(A) Rates of Chlamydial Detection from the Pharynx and Rectum in Patients with Genital Chlamydial Infection

	Pharynx		Rectum	
Male	2/51	3.9%	0/12	0%
Female	4/38	10.5%	24/25	53.3%

Table 1(B) Rates of Gonococcal Detection from the Pharynx and Rectum in Patients with Genital Gonococcal Infection

	Pharynx		Rectum	
Male	5/17	29.4%	0/15	0%
Female	5/15	33.3%	7/15	46.7%

Table 2 Differences in the Clinical Findings of Gonococcal Urethritis by Site of Source of Infection

		Gonococcal urethritis infected from the cervix ($n=135$)	Gonococcal urethritis infected from the pharynx ($n=51$)	Chlamydial urethritis ($n=175$)	Gonococcal cervicitis ($n=27$)
Age of patient (mean)		27.2 years	30.8 years	29.7 years	23.2 years
Incubation period (mean)		5.2 days	10.6 days	7 days	?
Urethral discharge	Amount	Profuse	Rather profuse	Scant	—
	Characteristics	Purulent	Purulent	Serous	—
Leukocytes in urine sediment (mean)		≥50/HPF	≥30/HPF	3 to≤20/HPF	Variable
Peripheral blood leukocytes (mean)		9,500±2,300	7,900±1,500	6,300±1,900	5,500±1,300
% cases with CRP>0.5		28.6%	11.1%	0%	10.2%
Estimated number of organisms per swab		2×10^5 ≀ 3×10^6	7×10^4 ≀ 1×10^6	5×10^5 ≀ 3×10^6	3×10^4 ≀ 5×10^5
Quantity of organism in post-urination collected semen		Frequently≥10^3/m*l*	Frequently≥10^3/m*l*		
Semen	WBC	15,000		2,200	
	Granulocytes (mean)	10,000		1,800	
	Lymphocytes (mean)	2,900		400	
	CD4 (mean)	1,200		20	

- Inflammatory symptoms are milder in chlamydial urethritis than in gonococcal urethritis (GU).
- The incubation period is longer, the CRP-positive rate is lower and the quantity of organisms at the infected site is smaller in GU infected from the female pharynx than in GU infected from the uterine cervix.

any lesions.

In the 1980s, changes in the pattern of sexual behavior and the consequent popularity of fellatio, generated an increase in the number of cases of gonococcal urethritis (GU) infected from the pharynx (Fig. 1).[6] Currently, gonococci are isolated from the pharynx in approximately half of all GU cases and from round 30% of gonococcal genital infections (Table 1).[7] Gonococci isolated from the pharynx are smaller in quantity than those isolated from the urethra or cervix. Possibly due to the smaller quantity of inocculated organisms at the time of infection,[8] GU infected from the pharynx has a slightly extended incubation period and slightly milder systemic inflammatory symptoms, including lower leukocyte counts and milder CRP than GU infected from the cervix (Table 2).

Points at issue of pharyngeal gonococcal

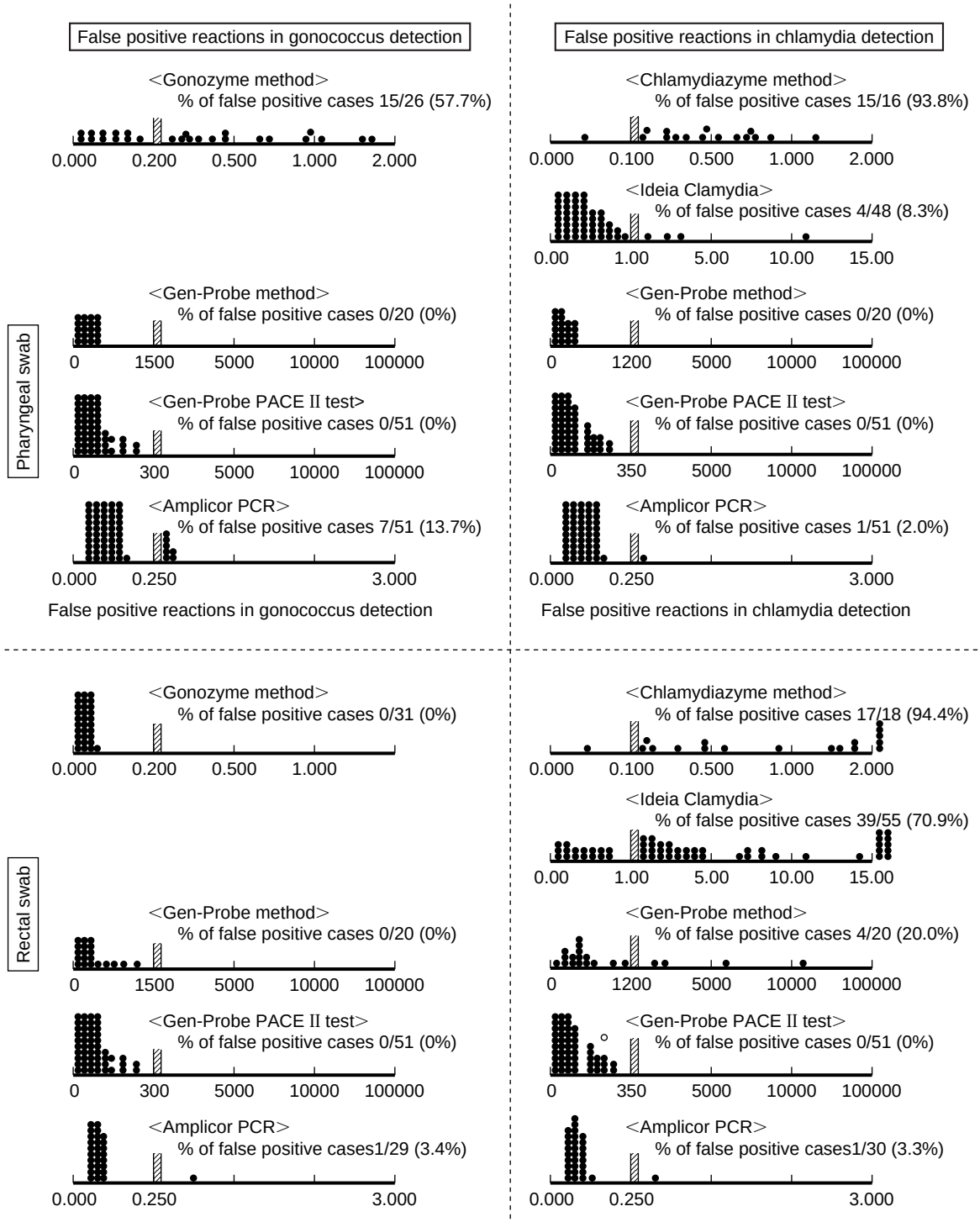

Fig. 2 False positive reactions with pharyngeal or rectal swab specimens negative for gonococci or chlamydias as tested by a non-culture detection assay for these pathogens

The non-culture detection assay is remarkably useful for the diagnosis of STDs; however, results of the assay are reported merely in terms of a positive or negative reaction, no isolates can be obtained and there is no means of reassessing the data. The assay may also give false positive results with pharyngeal and rectal swab specimens containing indigenous contaminants. An amplicor PCR assay is a highly sensitive detection test but produces false positive reactions with 10% or more of pharyngeal swab specimens which are later proven to be gonococcus-free.

infection include: (1) a lack of subjective symptoms, which thus constitute a source of infection over a long period of time, (2) difficulty in diagnosis, and (3) difficulty in attaining gonococcal eradication. Regarding point (1), gonococci are detected at this site of infection in 30% of male and female patients, respectively, but such patients usually have no clinical manifestations of inflammation such as a sore throat and redness and the infection tends to remain undetected unless such patients are specifically examined for the pathogen. Regarding point (2), gonococcal culture isolation cannot be achieved without using selective media for *Neisseria gonorrhoeae* since pharyngeal swabs also contain an abundant normal flora. Amplicor ploymerase chain reaction (PCR) assay, a nucleic-acid amplification test, is highly sensitive for detecting this organism, thus allowing for easier detection from the pharynx even when the gonococci are not abundant. However, the pharynx is indigenously inhabited by nonpathogenic *Neisseria spp*., cross reactions which cause false positive reactions in nearly 10% of all cases examined (Fig. 2).[9] As for (3), gonococci of the same strain may persist in the pharynx of the same individual even after the gonococci are eradicated from the urethra or uterine cervix by antimicrobial chemotherapy. It follows that pharyngeal gonococci are less liable to be eradicated by chemotherapy than the organisms infecting the urethra or uterine cervix. GU is an infection seen in healthy subjects without any associated local compromising factors, and the clinical response to chemotherapy does not vary among patients. In such cases, the breakpoint coincides with the minimum inhibitory concentration (MIC) for gonococci, which are eradicated without exception upon exposure to plasma drug concentrations above the MIC level over a period of 6–8 hours (Fig. 3). Failures have been encountered in chemotherapy for pharyngeal infection using spectinomycin (SPCM) and various other antimicrobial agents; accordingly, it is essential to confirm eradication after the completion of

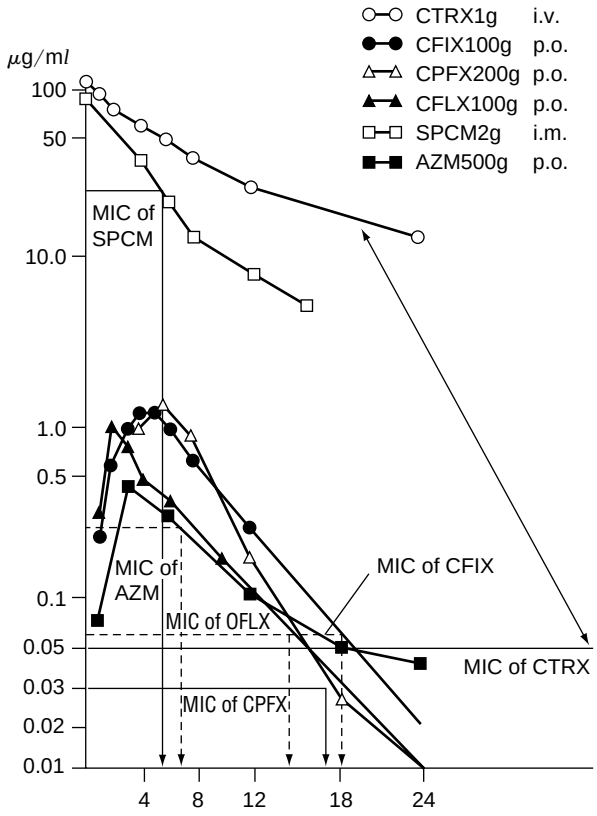

Fig. 3 Duration (hrs) of sustained time-above-MIC required for the eradication of GU, estimated from attained plasma concentration by single-dose therapy and gonococcal MIC values

As seen from the chart, gonococci in patients with gonococcal urethritis are eradicated within approximately 10 hours of sustained time-above-MIC for antimicrobial agents against isolates. With increasing MIC, the duration of sustained time-above-MIC is reduced, thus rendering single-dose therapy ineffective.

treatment.

CT is frequently detected in the pharynx of patients with a chlamydial conjunctival infection, whereas complications by pharyngeal chlamydial infection is less frequent among patients with urethral or cervical infection with this pathogen, as compared to gonococcal infections. The main problem implicit in gonococcal pharyngeal infection is its resistance to chemotherapy. The eradication of gonococci in GU can be accomplished with single-dose therapy with SPCM (2 g) in 100% of cases while that of pharyngeal gonococci occurs in no more than

half the cases treated. In Japan, furthermore, gonococci which are resistant to cephems have been rapidly increasing since 2000, in addition to the rapid increase in new quinolone-resistant gonococci encountered in the 1990s; it is now becoming increasingly difficult to eradicate pharyngeal gonococci. The following section pertains to the problem of increasing gonococcal drug resistance.

Increasing Gonococcal Resistance to All Antimicrobial Agents

According to the experience gained at the JRC Medical Center, treatment failure of GU during the 1976–1999 period was limited to one case, the first in Japan, in which treatment failed to eradicate an SPCM-resistant organism; one case of infection with penicillinase-producing *N. gonorrhoeae* (PPNG) previously treated with ABPC without success for 4 weeks at another institution, and cases of gonococcal pharyngeal infection. It was assumed that the succession of newly developed oral antimicrobial agents such as CEX, CCL, CFIX, PPA, NFLX, and OFLX, as well as single-dose therapy with intramuscular SPCM (2 g) and single-dose therapy with intravenous CTRX (1 g), would all be effective in the treatment of GU.

From 1989, failure to achieve eradication with new quinolones occurred, and the isolation of OFLX-resistant organisms with MICs of $\geq 1\mu g/ml$ increased to as much as 30% in 2000. The growing resistance to cephems has failed to attract much attention since the efficacy of SPCM, CTRX, and CFIX has been retained, however, such resistance has been increasing progressively for a long period of time. In 2000, cases of failure in treatment with CFIX appeared.[10] Increased resistance was also evident with such drugs as CTRX, CFIX, and CDZM against which the increase in gonococcal resistance had been rather modest among the cephems. In 2001, the highest MIC for CFIX against clinical isolates exceeded the attained plasma concentration (Fig. 4).[5]

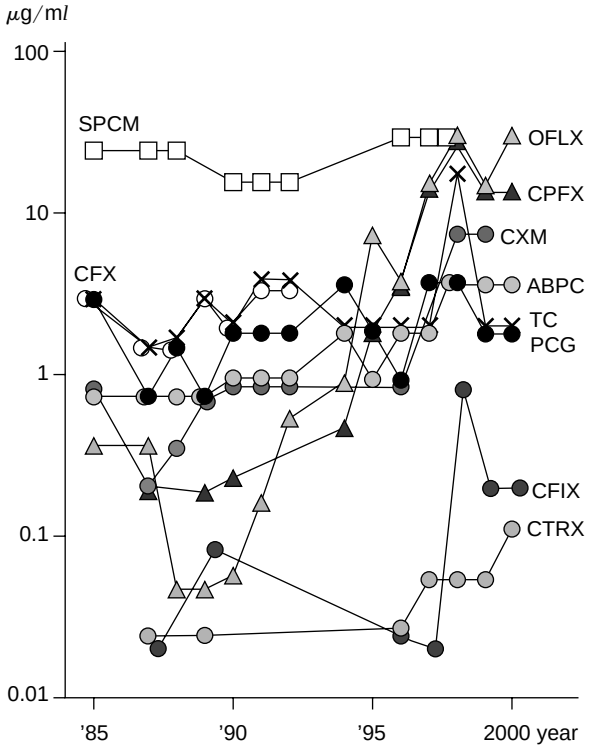

Fig. 4 Annual changes in highest MIC for non-PPNG *N. gonorrhoeae* isolates at the JRC Medical Center

The MICs of new quinolones increased sharply during the first half of the 1970s. There was a sharp increase in the MIC of CXM during the later half of the 1990s, and the MICs of CFIX and CTRX have also increased. The MICs of PCG, ABPC, and TC remained virtually unchanged during the 1985–2000 period, possibly because these drugs were not much used in Japan during this period.

ABPC (ampicillin), CEX (cefalothin), CCL (cefaclor), PPA (pipemidic acid), NFLX (norfloxacin), OFLX (ofloxacin), CFIX (cefixime), SPCM (spectionomycin), AZM (azithromycin), CPFX (ciprofloxacin), CTRX (ceftriaxone), CXM (cefuroxime), TC (tetracycline), PCG (benzylpenicillin), CDZM (cefodizime), CFX (cefoxitin)

For extensively used antimicrobial agents, the increased frequency of resistant organisms among gonococcal clinical isolates is known to accelerate if the MIC exceeds the attained plasma concentration. In Japan, there has been no further increase in the MICs of PCG and ABPC against gonococci despite the rapid increase in isolates resistant to new quinolone or cephems in the 1990s. PCG and ABPC use decreased before the advent of PPNG in Japan. In fact, a decrease, rather than a progressive

increase, in the MICs of these antimicrobial agents, which are not much used in Japan, has been noted (Fig. 4), thus indicating the possibility of back mutation in gonococcal chromosomal resistance.

SPCM-resistant gonococcal strains have existed for many decades, and the MIC for this antibiotic increases substantially via one-point gene mutations, yet the frequency with which such resistant strains has been isolated has not increased. The reason for this seems to be that few organisms survive after exposure to SPCM because eradication of infectant gonococci occurs following single-dose therapy with this antibiotic. The superiority of single-dose therapy is obvious even from these experiences. SPCM therapy is not effective in the treatment of chlamydial infection. The MICs of the new quinolones that were frequently prescribed in Japan against gonococci have increased rapidly. With these new quinolones, even parenteral administration yields plasma concentrations that are not appreciably different from those noted after oral administration; hence these new drugs have already become ineffective against gonococci. A considerable percentage of cephem-resistant strains have manifested an increased resistance to multiple classes of drugs, including the new quinolones. CTRX has an exceptionally long plasma elimination half-life as a cephem antibiotic and its MIC is approximately 0.25μg/m*l* against those gonococcal isolates obtained in 2000. Single-dose therapy with this cephem antibiotic will continue to be valid for some time before its MIC exceeds the level of approximately 20μg/m*l*. Somewhat illogically, however, its use in the treatment of gonococcal infection and urethritis is still not covered by the national health insurance system in Japan.

The MIC for gonococci of oral CFIX has been increasing and is now approaching the plasma concentration attained with a single 100-mg oral dose approved for insurance coverage. As a result, a failure in therapy has occurred. The Centers for Disease Control (CDC) in the United States recommend single-dose therapy with oral CFIX at 400 mg. It is merely a matter of time before a failure to achieve eradication occurs even with this dosage regimen. Under the national universal health insurance system in Japan, resistant gonococci that cannot be eradicated with usual doses of virtually all oral antimicrobial drugs have already emerged and SPCM is now not sufficiently effective against pharyngeal gonococci. In the treatment of gonorrhea, there can be no supreme manual for accomplishing a 100% eradication of the pathogen; thus the timely selection of drugs that are appropriate for the MICs of the infecting organisms in individual cases is required.[11)]

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Behavior Therapy for Nutritional Counseling

—In cooperation with registered dietitians—

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Abstract: Behavior therapy is a psychotherapy based on the behavioral sciences. Recent studies have revealed that it is most efficient for modifying clients' adherence, life-style, and health care behaviors. Its benefits are that the target behaviors are broad, the problem solving methods are practical, there are many flexible techniques, and furthermore, convenient approaches using standardized self-reference manuals or computerized programs can produce effects. These aspects and features are very beneficial and contribute sufficiently to nutritional education or dietary therapy by physicians. In the author's researches on obesity, hypercholesterolemia, and diabetes mellitus, the programs were comprehensive and the target behaviors consisted of eating, physical activities, interpersonal communications, behaviors for coping with stress, and maladaptive cognition. The techniques of behavior modification included target setting, self-monitoring, stimulus control, operant reinforcement, social skills training, cognitive restructuring, response prevention, and social support. All data showed that these behavioral approaches were effective. Recent studies on the one month's correspondent weight loss program have found that setting targets keeping a record of weight and progress related to targeted behaviors produce a weight loss of mean 1kg per month. If physicians can show their patients the reasons necessary for eating modifications and a suitable outline for dietary therapy, the registered dietician could then discuss what, how much, and how to eat with the referred patients, and give them the necessary practical advice. In this process, the individual target behavior and the monitoring sheet would become the common guide for the associated physicians, registered dietitians, and the patients. The goal of these cooperative team activities would be to build patients' self-care and self-control behaviors.

Key words: Behavior therapy; Nutritional education; Lifestyle modification; Cooperative team work; Patient's self-care

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Introduction

People generally understand that living healthily is the best way to control problems like diabetes mellitus, hypertension, hyperlipidemia and obesity. Keeping up a well-balanced diet, reasonable weight and regular exercise is a better cure than artificial medication. However, what people know is good for them and what they actually do tend to be very different. We constantly hear comments like, "I really worked at it, but lapsed after a month," "I don't know how to actually set about dieting," and "I understand what I need to do, but can't put it into practice."

Behavior therapy is a scientific psychotherapy that aims to modify people's behavior and habits in line with their life goals.[1] This therapy was pioneered in the 1950s on the basis of classical conditioning and operant conditioning theory. At first, it targeted problems like psychosis and developmental disorders. It proved remarkably efficient in overcoming these very difficult problems. By the 1970s, the therapy had evolved to tackle obesity, hypertension and psychosomatic disorders. In recent years, Japan has experienced a surge of interest in the application of behavior therapy to health promotion and disease prevention.[2]

To date, the author has worked on behavioral therapy for obesity, diabetes mellitus and hypercholesterolemia in Japan. The therapy has turned out be very effective for Japanese patients, so its application plainly goes beyond its Western origins.

All the therapeutic programs involved a comprehensive approach. They included goal setting, self-monitoring, operant reinforcement, stimulus control, response prevention, cognitive restructuring, social skills training and lifestyle factors (regular exercise, stress prevention and communication skills) in addition to diet. However, this article focuses on diet and nutritional education.

Physician-Specific Issues in Nutritional Education

Generally physicians have not had training in nutritional education, and are too busy to spend time becoming adept at it. Even if they realize the importance of nutritional education, they may tend to deal with it only briefly, or pass it on to a registered dietician. The common image of nutritional education is that it merely involves advice on the nutrients in foods; how many calories are required to produce energy, the recommended intake of protein and fat in grams, vitamin units and so on.

However, behavior therapy is really about self-control over cravings, and controlling one's eating environment sensibly. Of course, information on the nutritional components of foods (the dietitian's field) is also important. Nonetheless, since eating is a fundamental behavior for everyone, physicians are well placed to grasp the general rules of a healthy diet and provide useful advice.

For patients, a single word from their physician can have a major impact. If the physician plans the goals and steps for dietary therapy on a pathological basis, the dietician can follow this up with specific, detailed guidance. If the physician and dietician can define their roles clearly along such lines, the outcome for the patient will surely be better.

Self-reference manuals and computer assignments are helpful in providing concrete schedules for behavioral therapy. In the author's experience, a schedule involving simple, specific goals (such as keeping a regular record of one's weight, and limiting one's rice intake to one bowl at meals) resulted in a significantly healthier lifestyle and a mean weight loss of 1 kg.[4]

This kind of nutritional counseling is easy for patients to understand and put into practice. It should also be easy for physicians and dieticians to work together to give guidelines of this kind.

This article outlines the behavioral charac-

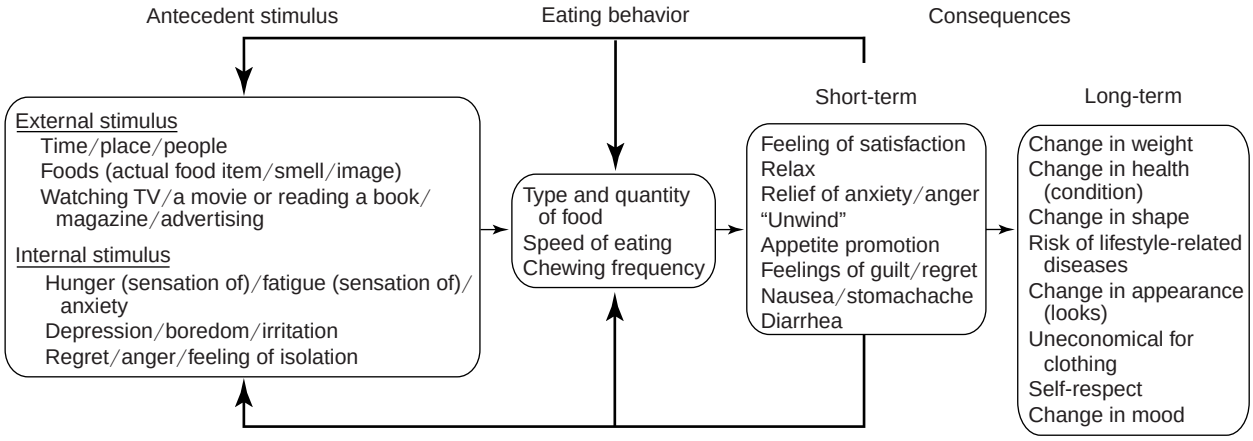

Fig. 1 Model of eating behavior
Antecedent stimulus includes both conditioned stimulus and discriminative stimulus. Behavior refers to the strong influence received immediately after a consequence happens (short-term), as opposed to potential future occurrences. In addition, the event (incident) generated by a behavior will become an antecedent stimulus leading to the formation of a behavior chain.

teristics of eating and goes on to discuss practical nutritional education based on behavioral science. It concludes by suggesting a basic structure for conducting therapy.

Characteristics of Eating Behavior

It goes without saying that eating behavior is indispensable to the maintenance of life, and is a behavior we perform automatically, without ordinarily being conscious of its particularities. Furthermore, as with the use of bait to train animals, 'food' exerts a major influence on behavior and represents a powerful stimulus. Eating is also entertainment and consolation, it is a social and cultural activity.

In addition, behaviors including 'eating as much as possible,' 'the preference for sweet and high-fat foods' and 'conserving energy when unable to eat,' were acquired over several million years from primeval times in response to an environment of scarce food resources. These behaviors represent basic human adaptive characteristics that were valuable in long human history but have become negative factors in our modern society, where unhealthily rich foods and sedentary lifestyles make everyone prone to eat too much.

The main stimulus for unhealthy eating behavior involves conditioning in which sensations of hunger and satisfaction become particularly intense (Fig. 1). Here, resisting hunger pangs leads to pain, people reach for their favorite snacks even on a full stomach, and snacking while watching TV becomes habitual. Eating becomes directly connected with feelings, and people will eat when bored, or use food as a way of coping with feelings of anxiety, anger or nervousness. In this way, the feelings that come before eating, and the sense of reward that is experienced immediately after, exert a powerful stimulus on behavior. The model for eating behavior becomes the exact opposite of the healthy physical activity model, as depicted above.

Furthermore, since human beings are programmed by nature to eat as much possible, restraining one's eating to the extent of fasting or dieting may seem unnatural and stressful.[5] Loss of control in eating snack foods among chronic dieters, and overeating under the influence of alcohol or as the result of depression, are well known examples of this phenomenon.

In many cases, the restrictions on eating imposed by diet therapies only serve to reinforce chronic dieting. Counselors, then, need to

realize that dieting is inherently problematic, and that on occasion dieting has the potential to trigger depression and abnormal eating behavior.

Behavioral Nutritional Counseling in Practice

In practice, nutritional counseling involves establishing specific and practical goals. These goals will be based on assessment of a patient's lifestyle, including their dietary and exercise habits, and will also take into account their clinical history and medical data. These tasks are known as 'behavioral assessment and goal setting' and equate to the 'diagnosis and treatment policies' conducted by physicians.

It must be possible to put all the goals that are set into actual practice. It is also vital to encourage patients to believe in their own abilities to reach their goals. To this end, the following must be given due consideration. (1) Assessments should be conducted without prejudice; and the facts must be evaluated honestly. (2) In setting goals, the patients intentions should be respected and goals chosen in terms of whether they can be reached. (3) Teaching materials should be easy to understand, with information presented in a concise format. In addition, behavioral goals should be objective and specific, such as 'Eat just one sweet as a snack between meals' or 'Limit alcohol to one 350 cc beer.' Goals should be selected on the basis that there is a 70–80% chance of reaching them so long as the patient makes a reasonable effort. Reducing psychological resistance to healthy new behavior and encouraging patients to actually begin this is also important. Once a patient gets started it will become easier for them to advance to the next stage. Even if a patient's diet remains very problematic after starting, the patient will at least be exercising caution. A small improvement is better than no improvement at all. The counselor's job is to identify and encourage any small signs of improvement, and to build up the self-respect and motivation of the patient.

Getting patients to conduct self-monitoring by recording adherence/non-adherence to behaviors that have been set as goals is very effective in helping them to reach those goals. Self-monitoring will naturally include the recording of weight, blood pressure and blood sugar values. Patients should be given a formatted sheet and asked to complete sections with the therapist's assistance. This will help to make the problem areas and goals become real and important. As mentioned above, if patients can be encouraged to carry out this self-monitoring, positive results can be expected from the program (Table 1).

There are various other specific techniques that will help improve eating habits. These techniques include stimulus control techniques such as 'While eating, don't do other activities' (e.g. don't watch TV while eating), 'Keep foods out of sight except at proper mealtimes,' 'Count the number of times you chew' and 'Eat small mouthfuls.' This kind of advice will promote slower consumption of food. Other techniques include doing something else (e.g. taking a shower or going for a walk) when the urge to eat arises.[6)]

Furthermore, since breaking habits — and dietary habits in particular — is an inherently difficult process, step-by-step modifications with gradual progress to the next stage are more likely to produce results. Abrupt changes are liable to cause harmful rebounds.

The most important point is for physicians and dietitians to recognize that they represent the patient's social support. They need to consciously use the principles of operant conditioning (reinforcing). This means rewarding good behavior patterns with praise and encouragement. In other words, consultations should not be linked entirely to changes in laboratory values. They should focus on actual behavior; acknowledging even small improvements. This will give patients great help in staying motivated. Even in the face of undesirable results, doctors and nutritionists should avoid blaming

Table 1 A Specific Example of Eating Modification

1. goal-setting	• Specify behavioral objectives (weight/diet/exercise/dealing with hunger).
2. self-monitoring	• Record eating behavior (content/quantity/time/place/mood). • Record your weight. • Record adherence/non-adherence to behavioral objectives (diet/exercise/dealing with hunger).
3. operant reinforcement	• Rate your behavioral goals, affix seals to your attendance sheet. • Praise desirable eating behavior and exercise behavior. • Give yourself a bonus (reward) when you lose weight, e.g. purchase a new item of clothing.
4. stimulus control	• Eat at regular times, in a fixed place, using fixed tableware. • Do nothing else while eating; devote yourself to meals. • Decide how much you are going to eat and serve yourself to a single helping. • Keep foods out of sight.
5. response prevention	• Wait 5-minutes, even if you have the urge to eat. • Use alternatives to eating like exercise or reading if you have the urge to eat. • Eat cucumber or celery if you are unable to resist the temptation to eat.
6. modification of eating	• Eat small mouthfuls; put your chopsticks down between bites. • Count the number of times you chew; use your other (non-dexterous) hand to eat.
7. social skills training	• Use role-play to practice refusing offers of food. • Practice polite ways of refusing that will not offend the person offering the food.
8. cognitive restructuring	• Vocalize words of encouragement if you feel disheartened (self-talk). • I want to eat sweet things . . . it's only because you are bored. • My parents are overweight too . . . lifestyle factors play a major role (in this phenomenon). • Improve your image of your body and your self-image.
9. relapse prevention training	• Predict high-risk situations and practice handling them. • If your weight exceeds the upper limit, resume efforts to lose weight again. • Continue to exercise, find ways of dealing with stress.
10. social support	• Elicit the cooperation of your family, spouse or friends. • Attend group meetings and maintain contact with your treating physician.

patients and should instead focus on what is causing patients to fail. Goals should be modified so that the patient can begin to make achievements.

As patients improve it is easy to fall into the trap of thinking that 'achieving improvements is only natural.' Signs of progress should still be used as opportunities for providing feedback in order to sustain the patient's motivation over the long term.

The Basics and Benefits of Counseling Based on Behavior Therapy

The principle objectives of behavior therapy can be summarized as 'preparing a healthy environment and promoting self-control techniques that will help healthy behaviors' (Fig. 2). The behaviors referred to here are not only visible behaviors, but also include positive intentions and feelings.

Desirable behaviors need to be defined according to what the patient can actually achieve, and they need to be put in specific terms. The therapist then needs to offer ongoing monitoring and encouragement. This is identical to conventional treatment and counseling. Indeed, the treatment process for behavior therapy deliberately follows the path of operant conditioning theory.

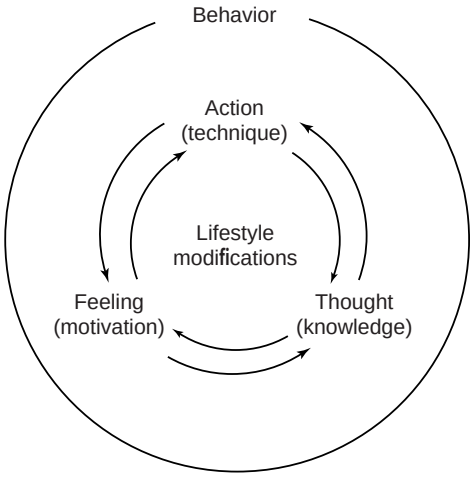

Fig. 2 Three components of behavior

Moreover, since behavior therapy offers a realistic step-by-step approach that evolves from attainable goals and is flexible to the patient's needs, most people are receptive to it.

This author believes that the theory and methods of behavior therapy can be utilized in daily life, any time, anywhere and by anyone, to address everything from time management to interpersonal relationships. Once the principles underpinning the theory are understood, the therapy can be employed by anyone irrespective of their professional discipline. The theory also allows the patients themselves to embark upon a course of self-learning. Even in the absence of time and human resources, tools such as self-manuals[7] and correspondence counseling programs are available and effective.[3]

Even for diseases such as bulimia and obsessive-compulsive neurosis, which are particularly difficult to treat, the movement toward guided self-treatment with manuals is a global trend.[8] There are few behavior therapy specialists, even internationally, for the reason that the treatment is conducted only by interviews and takes a great deal of effort.

Team treatment involving both physicians and dietitians is perfectly possible. If physicians can provide the motivation for patients to receive nutritional guidance, then registered dietitians and nurses can establish goals and offer continuous counseling. Ideally, the treatment team would hold study meetings ahead of time, read the same teaching materials and share knowledge on behavioral therapy for nutritional counseling. In this sense, the guidelines for behavioral therapy by team treatment can be likened to the musical score for an orchestra. The conductor of the treatment should by all means be the physician. This will help ensure that the team, inclusive of the patient, is able to create beautiful harmonies.

'Behavior' by our definition includes feelings and thoughts that are not externally visible. Actions, feelings, and thoughts should be treated in conjunction, as parts of the same whole.

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