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Sustained Visceral Fat Reduction with Muscle Preservation in Obesity Management Using Intensive Lifestyle Modification and Meal Replacement: A 4-Year Follow-up Case Report

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ABSTRACT

Background: Obesity presents a global health challenge, yet sustained weight loss with favorable body composition remains difficult. This case demonstrates the efficacy of intensive lifestyle modification (ILM) combined with meal replacement (MR) in achieving significant, sustainable weight loss over 4 years.

Case Presentation: A 52-year-old Thai female with severe obesity (BMI 44.1 kg/m², weight 102 kg, height 152 cm) enrolled in an ILM+MR program including: (1) soy-based meal replacement twice daily for 8 weeks, (2) nutritional counseling, (3) structured physical activity, and (4) behavioral modification through group therapy.

Results: At 8 weeks: weight 86 kg (15.7% reduction), BMI 37.2 kg/m², waist 42 inches (6-inch reduction), fat mass decreased 8.2%, muscle mass increased 2.1%, visceral fat level reduced from 30 to 24. At 1 year: weight 70 kg (31.4% reduction), BMI 30.2 kg/m², demonstrating progression from Class III to Class I obesity. At 2 years: weight 59 kg (42.2% reduction), BMI 25.5 kg/m² (overweight category). At 3 years: weight 58 kg (43.1% reduction), BMI 25.1 kg/m². At 4 years: weight 53 kg (48.0% sustained reduction), BMI 22.9 kg/m² (normal weight), with exceptional body composition showing 29.5% body fat, 26.8% muscle mass, and visceral fat level of 6.

Conclusion: Intensive lifestyle modification with meal replacement achieved remarkable weight loss of 48.0% maintained over 4 years with exceptional body composition changes. This case demonstrates extraordinary long-term efficacy in a patient with severe obesity, achieving and maintaining normal BMI with sustained improvements in metabolic health markers.

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KEYWORDS:

Obesity, Severe Obesity, Weight Loss, Intensive Lifestyle Modification, Meal Replacement, Body Composition, Long-term Follow-up, Visceral Fat, Case Report

1. INTRODUCTION

Obesity affects over 650 million adults worldwide, with Thailand reporting over 42% prevalence, one of the highest in Asia [1,2]. Severe obesity (BMI ≥40 kg/m²) represents a particularly challenging condition with substantially elevated health risks including type 2 diabetes, cardiovascular disease, certain cancers, and psychological disorders [3,4]. Despite numerous interventions, approximately 80% of individuals regain weight within 3-5 years [5], with severe obesity presenting even greater challenges for sustained weight loss.

Lifestyle modification remains first-line therapy, though conventional programs often achieve limited success in severe obesity [6]. Intensive lifestyle modification (ILM) programs with comprehensive support may achieve better outcomes [7]. Meal replacements enhance adherence and provide structured calorie control [8].

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However, long-term data beyond 1-2 years in severe obesity remain limited. This case demonstrates exceptional weight loss maintained over 4 years in a patient with severe obesity through ILM incorporating meal replacement [20], with detailed anthropometric and body composition data at baseline, 8 weeks, 1 year, 2 years, 3 years, and 4 years.

2. CASE PRESENTATION

Patient Information

A 52-year-old Thai female presented with 10-year progressive weight gain (70 kg to 102 kg) in the context of relatively short stature (152 cm). Medical history was unremarkable, though family history included parental type 2 diabetes and cardiovascular disease. Multiple previous weight loss attempts achieved only modest, unsustained success. She worked in an office setting with irregular meal patterns, minimal physical activity, and inadequate sleep (<6 hours nightly).

Physical examination revealed severe central obesity with normal vital signs (BP 128/82 mmHg, HR 76 bpm). Baseline measurements: weight 102 kg, height 152 cm, BMI 44.1 kg/m² (Class III severe obesity), waist circumference 122 cm (48 inches). Body composition analysis revealed: 42.0% body fat, 19.2% muscle mass, visceral fat level 30, indicating severe excess adiposity with very high visceral fat and reduced lean mass percentage.

Table 1. Baseline Anthropometric and Body Composition Measurements

Variable	1st Assessment Before Program
Weight (kg)	102
Height (cm)	152
BMI (kg/m²)	44.1
Waist Circumference (inches)	48
Body Fat (%)	42.0
Body Muscle (%)	19.2
Visceral Fat Level	30

3. THERAPEUTIC INTERVENTION

The intervention comprised four integrated components:

1. Dietary Intervention: Soy-based meal replacement (220 kcal/serving) twice daily for 8 weeks replacing breakfast and dinner, with comprehensive nutritional counseling emphasizing balanced nutrition, high-fiber vegetables, lean protein, low glycemic index carbohydrates, and portion control. Given the patient's severe obesity, caloric deficit was carefully monitored. After 8 weeks, gradual transition to whole-food-based meals with continued option for periodic meal replacement use.

2. Physical Activity: Initially slow walking 10 minutes after breakfast, 5 minutes after lunch and dinner (20 minutes daily total); self-stretching 5 minutes hourly during waking hours. Gradual progressive increase in duration and intensity as fitness and mobility improved, eventually reaching 45-60 minutes daily walking with added resistance exercises.

3. Behavioral Modification: Intensive weekly 90-minute group therapy sessions for 12 weeks, then biweekly for 6 months, then monthly maintenance sessions. Content addressed self-monitoring, goal-setting, stimulus control, problem-solving, stress management, relapse prevention, and body image concerns. Weekly phone contact and online support platform access throughout.

4. Sleep and Stress Management: Sleep hygiene education targeting 7-8 hours nightly; stress management techniques including mindfulness, progressive muscle relaxation, and cognitive behavioral strategies for emotional eating.

4. FOLLOW-UP AND OUTCOMES

Eight-Week Assessment: Weight decreased to 86 kg (16 kg loss, 15.7% reduction), BMI 37.2 kg/m² (remaining in Class III obesity but showing progress), waist 42 inches (6-inch reduction). Body composition: fat 34.3% (7.7% decrease), muscle 21.3% (2.1% increase), visceral fat level 24 (20% reduction). The patient reported increased energy, improved sleep, better mood, enhanced mobility, and reduced joint discomfort.

1- Year Assessment: Weight 70 kg (32 kg total loss, 31.4% reduction), BMI 30.2 kg/m² (Class I obesity), waist 39 inches (9-inch total reduction). Body composition: fat 32.5% (9.5% total decrease), muscle 23.4% (4.2% increase), visceral fat level 14 (53% reduction from baseline). Successful transition to whole- food eating with portion control, 30 minutes daily walking plus strength exercises twice weekly.

2- Year Assessment: Weight 59 kg (43 kg total loss, 42.2% reduction), BMI 25.5 kg/m² (overweight category, no longer obese), waist 34 inches (14-inch total reduction). Body composition: fat 31.8% (10.2% total decrease), muscle 24.8% (5.6% increase), visceral fat level 8 (73% reduction). Patient continued healthy eating with occasional meal replacement use (1-2 times weekly), maintained 45 minutes daily activity including walking and resistance training.

3- Year Assessment: Weight 58 kg (44 kg total loss, 43.1% reduction), BMI 25.1 kg/m² (borderline overweight/normal), waist 34 inches. Body composition: fat 31.4% (10.6% total decrease), muscle 25.4% (6.2% increase), visceral fat level 7.5 (75% reduction). Patient demonstrated exceptional maintenance with healthy behaviors fully integrated into lifestyle, high satisfaction, and continued improvements.

4- Year Assessment: Weight 53 kg (49 kg total loss,

48.0% sustained reduction), BMI 22.9 kg/m² (normal weight range), waist 28 inches (20-inch total reduction). Body composition: fat 29.5% (12.5% total decrease), muscle 26.8% (7.6% increase), visceral fat level 6 (80% reduction from baseline). Patient achieved and maintained normal BMI with exceptional body composition improvements. She reported sustained high energy, excellent sleep quality, active lifestyle including 60 minutes daily activity, and complete confidence in permanent lifestyle change. Occasional meal replacement use (1-2 times weekly) continued as convenient option.

Table 2. Anthropometric and Body Composition Changes Over 4 Years

Parameter	Baseline	8 Weeks	1 Year	2 Years	3 Years	4 Years
Weight (kg)	102	86	70	59	58	53
BMI (kg/m²)	44.1	37.2	30.2	25.5	25.1	22.9
Waist (inches)	48	42	39	34	34	28
Body Fat (%)	42.0	34.3	32.5	31.8	31.4	29.5
Body Muscle (%)	19.2	21.3	23.4	24.8	25.4	26.8
Visceral Fat Level	30	24	14	8	7.5	6

5. DISCUSSION

This case demonstrates that intensive lifestyle modification with meal replacement achieved extraordinary weight loss of 48.0% (49 kg) maintained over 4 years in a patient with severe obesity (baseline BMI 44.1 kg/m²), progressing from Class III severe obesity to normal BMI (22.9 kg/m²). This outcome substantially exceeds typical results from both conventional lifestyle programs (5-10% weight loss) [20] and most bariatric surgery outcomes at 4 years [9,10].

The patient's short stature (152 cm) contributed to the severity of obesity at baseline, with BMI reaching 44.1 kg/m². However, this same factor made the absolute weight loss of 49 kg represent a particularly dramatic transformation. The progressive, sustained weight loss over 4 years—rather than rapid initial loss followed by regain—suggests successful metabolic and behavioral adaptation. The minimal fluctuation between years 2-4 (59→58→53 kg) with continued gradual improvement demonstrates exceptional long-term stability [20].

The body composition changes merit particular emphasis and represent one of the most remarkable aspects of this case. Despite losing 48% of initial body weight, the patient increased muscle mass percentage from 19.2% to 26.8% (7.6 percentage points), while reducing body fat from 42.0% to 29.5% (12.5 percentage points). This pattern is highly unusual in weight loss interventions, where lean mass typically comprises 20-30% of total weight lost [11]. The preservation and enhancement of muscle mass likely reflects several factors: adequate protein intake maintained throughout the intervention, progressive resistance training introduced as mobility improved, and gradual sustained weight loss allowing metabolic adaptation.

The visceral fat reduction represents perhaps the most clinically significant outcome. Visceral fat level decreased from 30 (extremely high risk) to 6 (low risk)— an 80% reduction. Visceral adipose tissue exhibits greater metabolic activity than subcutaneous fat and contributes disproportionately to insulin resistance, dyslipidemia, cardiovascular disease, and metabolic syndrome [13,14]. The preferential loss of visceral fat with lifestyle intervention represents a key mechanism through which weight loss reduces cardiometabolic disease risk even before normalization of BMI [15]. This patient's visceral fat reduction occurred progressively and continuously over 4 years, suggesting ongoing metabolic improvements.

The waist circumference reduction of 20 inches (from 48 to 28 inches) provides clinical confirmation of the body composition improvements. This magnitude of central adiposity reduction is associated with substantial improvements in cardiovascular risk factors, insulin sensitivity, and inflammatory markers [16]. The patient's progression from severe central obesity to normal waist circumference represents a complete transformation of metabolic risk profile.

Meal replacements played a crucial initial role by providing structure, simplifying decisions, ensuring nutritional adequacy, and supporting early adherence during the most challenging phase [8,17]. The patient's continued flexible use of meal replacements 1-2 times weekly over 4 years suggests they served as a practical tool for maintenance rather than a crutch—available when needed but not required for success. This flexible integration may represent an optimal long-term strategy [20].

The intensive behavioral support component deserves recognition as potentially the most critical element enabling sustained success. Weekly then biweekly group therapy for extended duration provided ongoing accountability, peer support, problem-solving assistance, and skill development [18]. The gradual transition from intensive to maintenance-level support (weekly→biweekly→monthly) likely facilitated autonomy while maintaining connection to the program. The patient's reported integration of healthy behaviors as "normal" rather than requiring constant effort suggests successful habit formation—the ultimate goal of behavioral intervention.

From a clinical perspective, this case suggests that

properly designed ILM programs can achieve outcomes in severe obesity that rival or exceed bariatric surgery, at least in highly motivated individuals. Typical 4-year post-surgical weight loss ranges from 25-35% of initial body weight [19], compared to this patient's 48%. While surgical intervention remains appropriate for many patients with severe obesity, this case demonstrates that intensive non-surgical approaches can achieve exceptional results when patients are willing and able to engage fully.

The public health implications warrant consideration. The intervention components—meal replacements, structured progressive physical activity, comprehensive nutritional counseling, and intensive behavioral support—are all implementable in primary care or community settings with appropriate resources. While this intensive approach requires more resources than minimal intervention, the outcomes justify investment. The cost per quality-adjusted life year gained likely compares favorably to bariatric surgery when factoring in surgical risks, complications, and nutritional complications.

Limitations: Critical limitations must be acknowledged. This case represents an extraordinarily motivated, engaged patient achieving ideal outcomes under optimal conditions. Such results should not be assumed generalizable to broader populations. While the patient's age (52 years) places her in a demographic where weight loss becomes progressively more challenging due to age-related metabolic changes, her absence of significant comorbidities at baseline and exceptional adherence represent favorable prognostic factors not universally present in this age group. Population-level implementation would likely yield substantially more modest average outcomes, though even 25-30% weight loss with good maintenance would represent significant public health impact. The single-case design precludes causal attribution or assessment of which intervention components were essential versus supplementary. The patient's self-report of adherence could not be objectively verified, though the body composition results provide indirect evidence of sustained behavioral change. Long-term follow-up beyond 4 years is needed to determine if maintenance continues or if eventual weight regain occurs, particularly as the patient enters her late 50s and faces additional age-related metabolic challenges. Finally, this case cannot address potential negative consequences of such substantial weight loss, such as excess skin, nutritional deficiencies, or psychological challenges, though none were reported. The patient's successful outcome at age 52 does suggest that intensive lifestyle modification can be highly effective even in middle-aged adults, challenging the notion that substantial sustainable weight loss is only achievable in younger populations.

6. CONCLUSION

This case documents extraordinary weight loss of 48.0% (49 kg) sustained over 4 years in a patient with severe obesity (BMI 44.1→22.9 kg/m²) through intensive lifestyle modification incorporating meal replacement. The exceptional outcomes include progression from Class III severe obesity to normal BMI, 80% reduction in visceral fat, 20-inch waist circumference reduction, substantial body fat loss with simultaneous muscle mass gain, and complete integration of healthy behaviors into permanent lifestyle. While representing an ideal outcome not universally achievable, this case demonstrates that comprehensive, intensive, sustained lifestyle intervention can produce results in severe obesity that rival or exceed bariatric surgery in motivated individuals. Key success elements included initial intensive meal replacement with gradual transition to whole foods, comprehensive nutritional education, progressive physical activity, intensive behavioral support with gradual reduction in intensity, flexible ongoing use of learned strategies, and exceptional patient motivation and adherence. Such programs, when properly designed and implemented with adequate resources and support, represent viable alternatives to surgical intervention for carefully selected patients with severe obesity willing to engage in intensive long-term behavioral change.

Patient perspective

"Four years ago, I weighed 102 kg on my 152 cm frame and felt trapped in my body. I couldn't imagine losing 49 kg and keeping it off, but here I am at 53 kg—a weight I haven't seen since my 20s. The journey wasn't easy, especially the first year, but the program gave me everything I needed: structure through meal replacements when I needed it most, education about nutrition so I could make my own choices, group support so I didn't feel alone, and behavioral tools to handle stress without eating. Now, four years later, healthy eating and daily activity are just who I am. I still use meal replacements occasionally—maybe once or twice a week when I'm busy—and they help me stay on track without being restrictive. My energy is incredible, I sleep wonderfully, and I can do activities I never dreamed possible. But the most important change isn't physical—it's mental. I learned that I'm capable of permanent change, that I can trust myself, and that I deserve to be healthy. This program didn't just change my weight; it changed my entire life. I'm confident this is forever because it's not a diet—it's simply how I live now."

Learning points

- Intensive lifestyle modification with meal replacement can achieve extraordinary weight loss (48% over 4 years) with progression from severe obesity (BMI 44.1) to normal weight (BMI 22.9) in highly motivated individuals
- Exceptional body composition outcomes are achievable with proper intervention design: muscle mass can increase (7.6 percentage points) while

simultaneously achieving substantial fat loss (12.5 percentage points)

- Visceral fat reduction of 80% represents dramatic improvement in cardiometabolic risk profile and may be the most clinically significant outcome
- Gradual, progressive weight loss over extended duration (rather than rapid initial loss) may facilitate better metabolic adaptation and long-term sustainability
- Intensive behavioral support with gradual transition to maintenance-level contact enables skill development while promoting autonomy
- Initial intensive meal replacement (8 weeks) combined with concurrent nutritional education enables successful transition to sustainable whole-food eating
- Flexible continued use of meal replacements (1-2 times weekly) may support long-term maintenance without creating dependence

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