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Incorporation of occupational based intervention into joint protection education for individuals with thumb carpometacarpal osteoarthritis: A case series

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ABSTRACT

Background: To our knowledge, the use of occupational performance in education on joint protection techniques has not been studied for individuals with thumb carpometacarpal (CMC) osteoarthritis.

Purpose: This case series was designed to investigate if occupation-based instruction inside the clinic was useful and found satisfactory as an educational tool for individuals with thumb CMC joint arthritis.

Methods: Three participants with thumb CMC joint osteoarthritis performed washing, rinsing, and drying a dish, moving a pot and pan, maneuvering a laundry basket, and pouring from a pitcher during joint protection education in the therapy clinic with a skilled hand therapist in addition to routine treatment. Satisfaction with this intervention was assessed via a 3-question satisfaction survey. Pain with activity and function via the Thumb Disability Examination were assessed at baseline and a 4week follow up.

Results: Patients in this study expressed satisfaction with the inclusion of the performance of occupations in their joint protection education in the clinic. Pain with activity improved by an average of 1.7/10 on a 10-point Numeric Pain Rating Scale and function improved by an average of 10.04 on the Thumb Disability Examination.

Conclusions: Although no causal relationships can be assumed in this study, hand therapists should consider adding occupation-based intervention as a component of patient education on joint protection for individuals with thumb CMC joint osteoarthritis.

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Introduction

The integration of occupation-based interventions (OBI) into the outpatient therapy treatment of orthopedic hand and upper limb disorders is slowly emerging in both the literature and clinic-based setting.¹⁻⁴ This paradigm shift may in part be due to the renewed emphasis on activity and participation and health (function) versus disability found in the updated framework of the World Health Organization's *International Classification of Functioning, Disability and Health* (ICF).⁵ While the usefulness of OBI is gaining a bit of traction in the clinical setting as an intervention,^{1,4} there is not a clear

understanding of the role of performing OBI inside the clinic as a component of home program instruction and patient education.

By and large, in hand therapy practice, the importance of routine home program instruction is well identified⁶⁻⁸ and there are studies evaluating methods to improve carry over, outcomes, patient engagement and satisfaction.⁹⁻¹¹ Research has suggested that impactful treatment of hand therapy diagnoses such as osteoarthritis (OA) at the carpometacarpal (CMC) joint of the thumb can occur in an average of less than 2 skilled therapy sessions.¹² A large component of patient education for individuals who have symptomatic thumb CMC OA is to avoid the key pinch which promotes a stressful load to the thumb CMC joint and instead encourage the use of the stable "c" posture in which the dorsal ligaments of the joint become taut and thereby more supportive and the joint is in a closed packed/more stable position.¹²⁻¹⁵ Hand therapists are tasked with educating patients with thumb CMC joint OA on the importance of using healthy thumb postures during their occupational task performance.¹² The importance of patient education and in-

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struction cannot be understated when discussing joint posture and joint protection. Understanding and acknowledging the value of OBI to outcomes is likewise an important factor. This case series was designed to investigate if OBI instruction inside the clinic was useful as an educational tool for individuals with thumb CMC joint arthritis.

Purpose

The purpose of this case series is to 1) investigate the perceived experience of patients attending outpatient hand therapy for symptomatic thumb CMC joint OA when they engaged in OBI to practice joint protection techniques and 2) examine impact on pain and self-reported functional status when OBI is included with common non-surgical thumb CMC joint OA interventions.

Methods

Study design and participants

This study is a small case series with IRB permission sought and garnered prior to initiation. A convenience sample of 3 patients were recruited from 2 outpatient orthopedic hand therapy clinics. It is identified that case series have relatively low numbers of participants and the specific number of patients, the temporal direction of follow-up or even the definition by case/exposure are not differentiating characteristics of case report/series.¹⁶ Although a case series is identified as a lower level of evidence the benefit of such research is that new hypotheses may be formulated which in turn could then be tested with formal research methods that are designed to refute or confirm the hypotheses.¹⁷ Treatment and data collection occurred in August 2021 through November 2021. The Inclusion criteria were that recruits 1) had a diagnosis of thumb CMC joint arthritis confirmed clinically or via radiographs by a hand surgeon, 2) were referred to skilled therapy for evaluation and treatment as appropriate and 3) were at least 18 years of age. Exclusion criteria were 1) a current or previous symptomatic hand diagnosis that could impact function other than the thumb CMC joint OA or 2) individuals who do not understand English due to the follow up which includes a phone questionnaire. The participants gave both oral and written informed consent. All evaluation and treatment were completed by 2 occupational therapists with certified hand therapy credentials and clinical doctorates in occupational therapy.

The initial assessment addressed the common areas related to body structure and functions which included grip and pinch strength, range of motion (ROM), sensation, and pain. The occupation-based portion of the assessment was captured through the interview process addressing activity and participation limitations and environmental factors which allowed a better understanding of barriers that were personal to each participant. The patient reported outcome, the Thumb Disability Examination (TDX) was also a useful tool for assessing occupational performance.

Interventions

All participants in this case series received treatment based on symptoms and research evidence¹⁸ and what is considered routine treatment for the 2 clinical sites participating in data collection. Routine treatment included paraffin,¹⁹ issue and/or recommendation of an appropriate orthosis,²⁰ a dynamic stabilization program (inclusive of thumb adductor stretching, joint mobilizations for realignment of the CMC joint, and neuromuscular re-education²¹ focusing on the opponens pollicis muscle and the first dorsal interosseus),¹² occupation-based intervention, education on appropri-

ate adaptive equipment, and education on joint protection techniques.

For the purposes of this case series, participants were verbally educated on joint protection techniques with emphasis to avoid use of a lateral pinch²² when able, use a stable “c” pinch when pinching posture was needed, to use larger joints as opposed to loading smaller joints, and use 2 hands instead of 1 when possible.²³ The participants were given written instructions on the use of these joint protection techniques for household management tasks (containing the images in Figs. 1-4), which were discussed between the patient and the hand therapist prior to the supervised performance of functional tasks in the clinic. Participants were then asked to complete the 4 following functional tasks while receiving skilled treatment in the clinic: 1) washing, rinsing, and drying dishes, 2) maneuvering a laundry basket, 3) lifting and moving pots and pans, and 4) pouring water from a pitcher. The treating therapist demonstrated the 4 tasks for the patient with good joint protection techniques and then had the patient perform them with verbal and tactile cuing as needed until the patient performed the tasks independently with good joint protection. These above specified tasks were selected for several reasons including evidence that suggests individuals with hand OA in general typically note difficulty with such household management tasks, the importance of these activities to the participants who identified as performing such daily household tasks with difficulty related to their thumb CMC joint OA symptoms, and the ease with which the activities could be performed in the clinic.²⁴

Outcome measures

Patient experience

A 3-item questionnaire of patient satisfaction was developed to better understand the patient experience of the combined activity performance with simultaneous verbal instruction. To our knowledge, there are no current questionnaires pertinent for the above purpose. Two questions examined level of agreement (strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree) with the statements, “I found performing the functional activities along with verbal instructions/verbal education in the clinic to be useful” and “Performing the functional tasks in the clinic seemed to be more helpful than written instructions”. The 5-point Likert scale was chosen for brevity and because scales with 4 categories or less have a reduction in reliability.²⁵ The third question was open ended and asked, “Any other comments on the inclusion of performing the functional tasks in the clinic today in addition to verbal education?”.

Functional status

The TDX was used in this case series to determine functional status. The TDX is a validated disease specific outcome measure that contains 20 questions divided into 3 sections based on different domains specifically related to the thumb and daily activities. The first section addresses arthritic thumb pain, with the first 7 questions related to 1-handed activities and the latter 4 related to 2-handed activities. The second section, thumb pain, has 5 questions, and the last section includes questions related to satisfaction with the affected thumb. All questions contain a 1-5 response scale with 1 indicating the most function, least pain, or greatest satisfaction for sections I, II, and III, respectively and is scored on a scale of 0 to 100, with a higher score representing a greater degree of disability in the thumb. The TDX's brevity is shown to have less of a burden on patients, is more responsive to changes in related symptoms, and correlates better with most objective and subjective metrics relevant to thumb CMC joint OA when compared with The Disability of the Arm, Shoulder, and

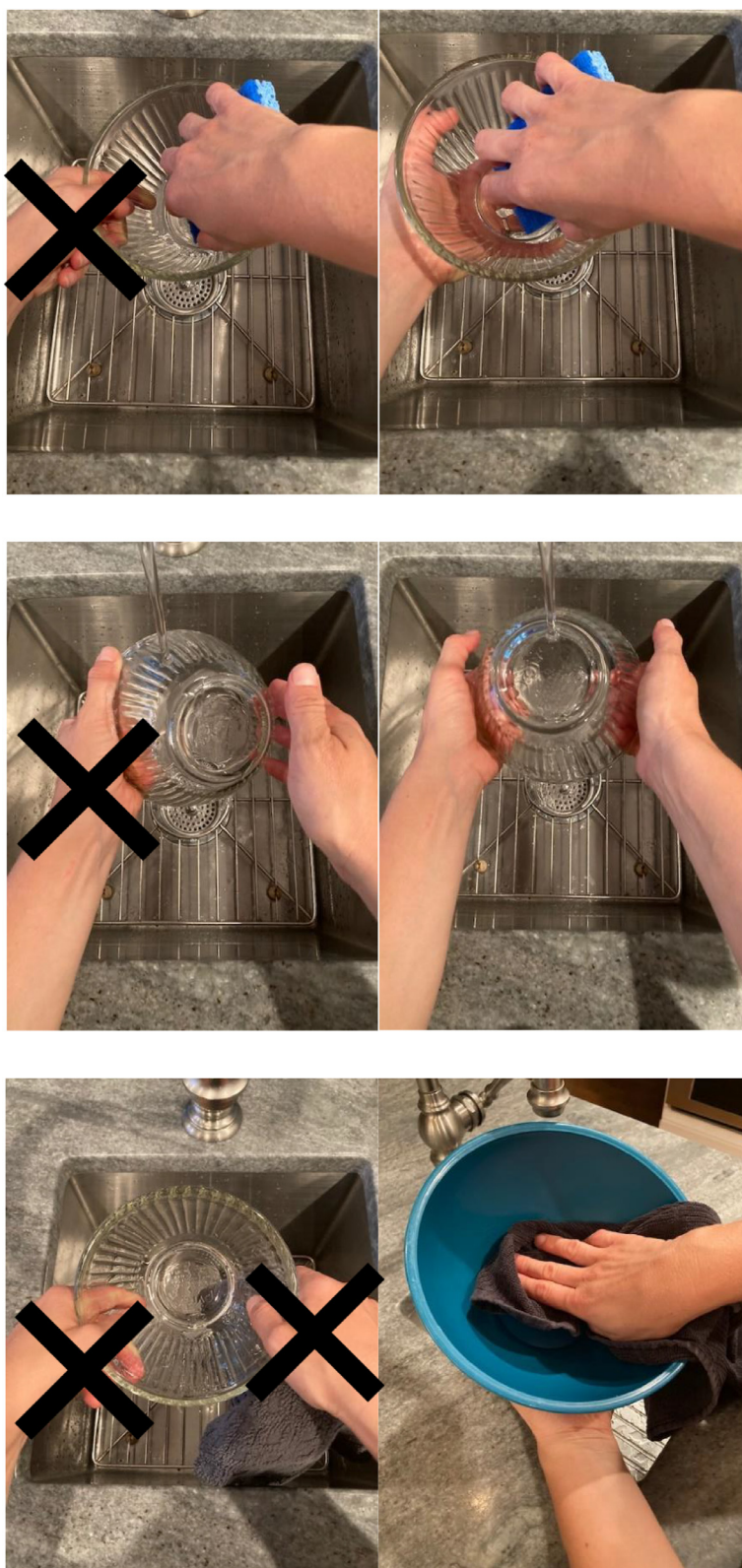


Fig. 1. Washing, rinsing, and drying a dish with appropriate joint protection for thumb CMC OA.



Fig. 2. Lifting and moving pots and pans with joint protection for thumb CMC OA.

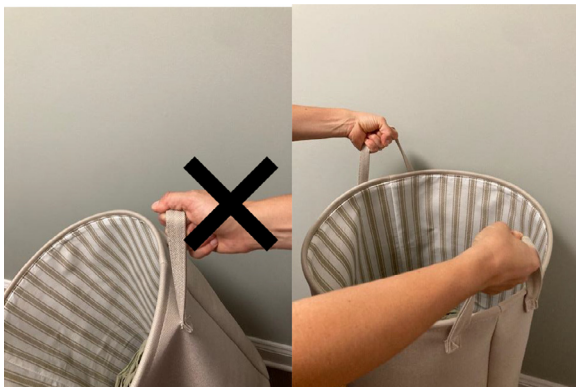


Fig. 3. Maneuvering a laundry basket with joint protection for thumb CMC OA.



Fig. 4. Pouring water from a pitcher with joint protection for thumb CMC OA.
CMC = carpometacarpal; OA = osteoarthritis.

Table 1

Participant Baseline Information.

Participant	Sex	Age	Dominant hand	Involved thumb
1	Female	71	Right	Right
2	Male	66	Right	Bilateral
3	Female	71	Right	Left

Hand (DASH).^{16,26} In addition, disease specific measures for conditions related to the hand offer improved responsiveness and correlation with symptoms when compared with global outcome measures such as the DASH.²⁷ Therefore, the use of a disease specific measure has the potential for greater benefit for therapeutic or interventional studies. The TDX is a reliable, reproducible tool with a significant correlation to the Visual Analog Scale (VAS)²⁸ as well as high content and concurrent validity respectively.^{29,30}

Pain

Pain was assessed via pain intensity during activity according to the Numerical Pain Rating Scale (NPRS). The NPRS is a pain assessment scale with a 10 cm line that represents a continuum between “no pain” (0/10) and “worst pain” (10/10) and is a valid, reliable, and responsive tool.³¹ The NPRS has demonstrated sensitivity to change in pain in patients with chronic musculoskeletal related pain.³² The minimal clinically important difference for the NPRS has been determined to be 1 point.³³

The 3-item survey was administered at the final in-person treatment session. The TDX and NPRS were completed pre-treatment at the in-person initial evaluation and the final assessment was completed via a phone call at 4 weeks post intervention. Four weeks was expected to be an appropriate time frame for follow up related to other OBI literature that assesses outcomes at 4 weeks post intervention.¹

Results

Three patients with thumb CMC joint OA were included in this study: 2 female and 1 male. The mean age was 69.33 years old (range 66-71) and all patients were right hand dominant with the involved side being varied; 1 right, one left and 1 bilateral. Refer to Table 1 for baseline characteristics. The patients attended an average of 3.3 visits (SD 1.5) and averaged 46.0 minutes each session (SD 4.4).

Patient experience

All 3 patients chose “strongly agree” to questions 1 and 2 on the satisfaction survey (Table 2) which were specific to satisfaction for performing the functional tasks in the clinic with verbal instruction and demonstration as well as the usefulness of the “hands on” aspect versus written instruction. Free text comments mentioned that in clinic performance of tasks helped the participant feel better about performing at home with the correct mechanics and postures and expressed satisfaction with the ability to get and give feedback during the performance of the functional tasks.

Functional status

The TDX score improved for all participants from baseline to 4-week follow up with an average decrease in TDX score of 10.04 (range 7.5-13.86) (Table 3). This change in the TDX score does exceed the calculated value for standard error of measurement for this assessment tool.³⁰

Table 2

Results of the Satisfaction Survey.

Participant	I found performing the functional activities along with verbal instructions/verbal education in the clinic to be useful.	Performing the functional tasks in the clinic seemed to be more helpful than written instructions.	Any other comments on the inclusion of performing the functional tasks in the clinic today in addition to verbal education?
1	Strongly agree	Strongly agree	No additional comments
2	Strongly agree	Strongly agree	I liked practicing in the hand therapy room. She gave me lots of tips and now I know I am doing it right. It is better than when they tell you how to do it. Now I feel better to do it right at home.
3	Strongly agree	Strongly agree	Performing functional tasks in addition to verbal instructions allows me to tell the therapist how my hand feels and the exact location of discomfort in the exact moment that it is happening. It provides much better communication of how the tasks affect my joints.

Table 3

Changes in scores between baseline and follow up for the TDX.

Participant	Baseline TDX	TDX at 4-wk follow-up	Change in score
1	58.75	51.25	7.50
2	62.50	53.75	8.75
3	38.86	25.0	13.86

Pain

The NPRS was used to rate pain during activity. Pain at baseline was 5.7/10 on average with a range from 4/10–8/10. Pain decreased by an average of 1.7/10 at the 4-week follow up (Table 4). This change in pain did meet the established minimal clinically important difference value for the NPRS for individuals with chronic musculoskeletal conditions.³³

Discussion

The purpose of this study was to understand if OBI's are useful as an in-person educational method for individuals with a diagnosis of thumb CMC joint OA. All participants in this study were educated on joint protection techniques for their thumb CMC OA diagnosis with the incorporation of performance of occupations inside the clinic during skilled hand therapy. All participants reported satisfaction with the inclusion of OBI in their treatment and experienced a decrease in pain and an improvement in function that was clinically significant^{30,33} per the TDX at a 4week follow-up assessment. Participants in this study were also instructed in the performance of a dynamic stability exercise program and educated on use of an orthosis for symptoms per typical facility protocols and per research evidence. Both the use of a dynamic stability program and the use of an orthosis for symptomatic thumb CMC OA have been found to decrease pain and improve functional performance.^{12,34–38}

A 2019 systematic review,¹ although not specific to thumb CMC joint OA, examined the effectiveness of OBI for upper extremity musculoskeletal conditions suggested that individuals who received OBI (as opposed to therapeutic exercise alone) showed benefits in patient-reported outcome measures, performance-based

outcome assessment and physical measures. A 2020 randomized controlled trial³⁹ with individuals with hand-related disorders suggests that those individuals treated with OBI versus physical exercises based on occupational needs reported greater satisfaction in their occupational performance. A recent study⁴⁰ has found the use of occupation-based kits. The kits were designed to address most occupation categories within occupational therapy's scope of practice.⁴⁰ This descriptive study found an increase in interventions at the occupation/activity level and a decrease in biomechanical interventions with use of the occupation-based kits and is like the findings for this study because the researchers found a high level of satisfaction with the incorporation of OBI.⁴⁰ The structured nature and client-centered focus of the occupation-based kit makes this a valuable tool worthy of consideration for occupation focused treatments.

To our knowledge, this is the first study to evaluate the impact of OBI with individuals with a diagnosis of thumb CMC OA. Despite evidence that advocates for the use of OBI for hand and upper extremity injuries, its routine inclusion into treatment regimens remains limited. A survey study⁴¹ identified that therapists do not use OBI as much as they would like in hand therapy settings with the largest limiting variable identified as time. In this case series, the OBI and education were prepared ahead of time, having images and functional items (laundry basket, pitcher, pot and pan, bowl, sponge, and drying towel) readily available and therefore implementation of the OBI in routine hand therapy sessions was able to occur in 2 busy outpatient orthopedic facilities.

Limitations

The small sample size is a limitation of this study along with the fact that the data collection occurred at only 2clinics using a convenience sample, thus decreasing the generalizability of the results. The satisfaction questionnaire was a 3 question self-designed measure, therefore is not a validated tool and may not capture all areas related to patient satisfaction. A case series is unable to provide information on relationships or causation in outcomes. In addition, the hand therapists providing the treatment did also assess the outcomes, which may have influenced responses on the satisfaction questionnaire. An additional limitation is found in that

Table 4

Change in pain with activity according to the NPRS.

Participant	Pain with activity at baseline according to NPRS	Pain with activity at 4-wk follow-up according to NPRS	Change in pain
1	5/10	3/10	2
2	8/10	7/10	1
3	4/10	2/10	2

the chosen occupations were pre-selected and not identified by the participant. Allowing the patient to choose the occupations would make the intervention more meaningful and inclusive. Finally, the satisfaction reported in this case series was on the inclusion of OBI into patient education for joint protection techniques and does not consider satisfaction with treatment outcomes.

Conclusion

Although no causal relationships can be assumed in this case series, performance of occupational based activities in the clinic during patient education for thumb CMC OA joint protection techniques was found to be satisfying to the participants in this study. All participants had an improvement in pain and function according to the TDX when OBI was incorporated into home exercise education. Hand therapists should consider adding OBI performance as a component of patient education on joint protection for individuals with thumb CMC joint OA.

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