Acute lymphoid leukemia and opportune treatment with physiotherapeutic intervention. Case report

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Abstract

The acute lymphoid leukemia (ALL) is a neoplasia characterized by the proliferation of clonal cells lymphoid. In pediatric patients, ALL accounts about 77% of all the leukemias, but in adults, the frequency varies according to the geographic location. The muscular atrophy is common in patients with cancer as a result of the protein catabolism caused by different factors produced by the tumor and contributes increasing inflammation, also considering the adverse effects originated by immunosuppressant drugs, and causing sedentary lifestyle and prolonged rest syndrome. An atypical case of leukemia severe lymphoid is presented with multiple lytic lesions in backbone, pelvis and cranium, besides vertebral crush fractures and spinal cord infiltration data, so the intervention of the physiotherapeutic management with the objective of pain control, increased skeletal muscle function, decrease of fatigue and increase the quality of life is considered indispensable within the multidisciplinary management.

Key words: Leukemia severe lymphoid. Muscle strengthening. Fatigue.

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Date of reception: 21-08-2017

Date of acceptance: 10-10-2017

DOI: 10.24875/j.gamo.M18000151

Available online: 24-02-2018

Gac Mex Oncol. 2017;16(6):352-355

www.gamo-smeo.com

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Problem statement

In general, all diseases are associated with pain, and acute lymphoid leukemia (ALL) is not the exception; consequently, some specialists avoid recommending physiotherapeutic intervention as part of the treatment.

Introduction

ALL is a neoplasm characterized by the proliferation of immature lymphoid clonal cells named blasts, which infiltrate and substitute bone marrow normal hematopoietic tissue. At pediatric ages, ALL accounts for nearly 77% of all leukemia cases; however, frequency in adults varies according to the geographic localization. In Mexico, ALL accounts for 50% of cases, unlike figures reported in developed countries, where the predominating leukemia is the acute myeloid type in adults^{1,2}.

ALL clinical presentation is characterized by the presence of anemia, hemorrhages and/or infectious processes, in addition to bone and joint pain in some cases. In addition to bone marrow infiltration, blasts can infiltrate extramedullary tissues such as the central nervous system, the skin, bone or lymph nodes (World Health Organization 2008, Lyon classification)³.

With pain being one of the most commonly reported symptoms, its detection and treatment of the affected zone is essential in order to decrease the corresponding swelling and muscle spasm. The physical method used is cryotherapy, which is focused on decreasing the effects at the tissue lesion, hemorrhage, edema, muscle spasm and pain.

On the other hand, fatigue is one of the most distressing symptoms, and it is reported in 80% of oncologic patients secondarily to pharmacological treatments⁴. Fatigue directly affects quality of life in a physical, emotional and cognitive form, and limits participation in activities of daily living. In patients with metastatic disease, the prevalence of cancer-related fatigue exceeds 75%, and is related to skeletal muscle loss, circadian rhythm desynchronization, genetic deregulation, hypothalamic-pituitary-suprarenal axis deregulation and cytokines proinflammatory effects⁵.

Reports on this type of patients are sparse in the national and international literature. The presentation of this clinical case aims to demonstrate the importance, the benefit and the need for physiotherapeutic intervention in muscle strengthening, gait retraining and in Jewett brace adequate use, with the purpose to preserve independence and reintegration to activities of daily living.

Physical activation reports great benefit at the muscular level, facilitates nervous stimulation, arcs of motion recovery and fatigue reduction; it prevents joint stiffness, decreases pain and improves functional capacity.

Objective

To assess the effect of physiotherapeutic interventions for muscle strength increase, the use of the Jewett brace and the perception of pain.

Specific objective

By means of muscle strengthening and by favoring spinal stability, gait retraining is intended for reintegration to activities of daily living.

Clinical case

This is the case of a 26-year old male patient with no relevant medical history, who, in August 2012, presented with dorsolumbar region 9/10 pain on the Visual Analogue Scale (VAS) irradiating to the lower limbs, which was oppressive, continuous and burning in nature, accompanied by paresthesia, dysesthesia and progressive strength loss. On physical examination at Emergency Department admission he had generalized strength loss (Lovett 0/5), 0/4 deep tendon reflexes (DTR) and sensitivity loss from T12 on, with sphincter preservation, 30% Karnofsky and a score of 4 in the ECOG (Eastern Cooperative Oncology Group) scale. Diagnostic workup showed normal blood count and acute renal failure. Lumbar spine magnetic resonance imaging (MRI) revealed multiple lytic lesions (C2, C6, T4, T5, T8, T9, T12, L1, L5 and S1, pelvis and skull) (Fig. 1), in addition to L1 vertebral compression fracture and data consistent with bone marrow infiltration at the T11 to L1 level.

Bone biopsy of the lesion showed B lymphoid blasts with T-markers aberrant expression. The patient started treatment for the spinal lesion with vertebroplasty and subsequent radiotherapy to the spine at 30 Gy in 15 fractions. He received treatment with Hyper-CA-VD protocol and obtained a complete response. Subsequently, hematopoietic stem cell allogeneic transplantation was carried out (2013). He had secondary complications, such as graft versus host disease at the level of the lung, mucosae and liver, in addition to infectious complications.

Figure 1. 2012 dorsolumbosacral spine MRI: data consistent with tumor activity at cervical C2, C6, T4, T5, T8, T9 and T12, lumbar and S1; L1 compression fracture and conus medullaris at L1. Rest of cauda equina and filum terminale elements without alteration. Data consistent with T11 to L1 infiltration, with medullary edema.

After initial chemotherapy treatment, he was referred to the Department of Oncologic Physical Rehabilitation in 2013, where he attended on a wheelchair, with tumor activity-related oppressive, burning thoracolumbar spine VAS 8/10 pain and lower limb paresthesias, dorsal T11 hyperkyphosis, T12-L1 compression fracture and data consistent with instability with a Spine Instability Neoplastic Score (SINS) of 11, lower limb hyporeflexia, T12, L1, L2 and S1 hyposensitivity, upper limb -4/5 and lower limb -2/5 strength according to Lovett, sphincter control, altered balance, coordination and proprioception, 40% Karnofsky and ECOG 3, which prompted for the use of Jewett-type orthotic device to be indicated with the purpose to stabilize the thoracolumbosacral spine.

Intervention

Treatment consisted of generalized muscle strengthening programs, emphasizing on the rhomboid, paravertebral, transverse abdominal, gluteal, quadriceps, hamstring and tibial anterior; muscles stretching for pectoralis major, latissimus dorsi, piriformis and triceps surae; proprioception, balance control and Jewett brace use. The patient showed constant improvement, and ambulation was therefore started with ergonomic use of orthotic devices after a 3-month intervention period. Subsequently, a program of therapeutic exercises was tailored for implementation at home on a day-to-day basis, with the purpose to prevent muscle atrophy and for spinal erector muscles adequate balance, as well as to prevent poor postural hygiene and further pain in the affected zone.

Exercise is a widely used therapeutic modality that has been shown to be efficacious in muscle treatment.

During the treatment, different types of exercise were used to favor muscle strengthening, including isometric, active free and closed chain exercises, specific exercises to work on balance and coordination and adequate exercises for proprioception in front of a mirror and with parallel bars to improve bipedalism integrated in the process of gait retraining, thus favoring patient safety.

Use the Jewett brace for 24 hours and cryotherapy were employed as analgesia method, with application time of 10 to 15 minutes using the cold pack technique in order to obtain a serotonin and bradykinin-release effect, producing a vasoconstriction effect and favoring a decrease in tissue lesion effects, hemorrhage, muscle spasm and pain, and influencing on muscle activity by its action on the contractile process and the effect of temperature on neuromuscular transmission.

Results

The patient assisted constantly for follow-up reassessment and prevention of future lesions. He was discharged from the Physical Rehabilitation Clinic with favorable clinical evolution, with independent bipodalic, plantigrade gait, symmetric DTRs, negative Lasegue, Bragard, Patrick and Milgram, no data consistent with neurotension or medullary compression, upper limbs +4/5 Lovett, and 4/5 for lower limbs and continuous use of the aforementioned brace, 80% Karnofsky and ECOG 1.

Figure 2. 2017 dorsolumbosacral spine MRI: progression of data consistent with tumor activity in comparison with figure 1.

Discussion

The purpose of this work was to assess opportune physiotherapeutic intervention for patient quality of life improvement. After 3 months of treatment, the patient referred successful functional improvement, although the MR image showed no structural improvement changes (Fig. 2). Regular practice of exercise at home aims to preserve the effects on the long term and this way facilitate reintegration to normal and instrumental activities of daily living.

It would be worth for the importance of physiotherapeutic intervention to decrease pain in patients with LLA to be analyzed and assessed.

Jewett brace and the perception of pain. By means of muscle strengthening and spinal stability, gait retraining is intended in order to facilitate reintegration to activities of daily living. In the treatment of patients with ALL, the importance of physical activity should be considered as a means to break the vicious circle of cancer treatment-associated constant fatigue, which can compromise patient quality of life.

Thermotherapy (vasodilation) contraindication favors an increase of cell metabolism, which elicits fatigue and increased blood viscosity, thus hindering therapeutic exercise correct performance, which is why this treatment modality is restricted in the oncologic patient. For this reason, cryotherapy is physiotherapy standard tool.

Conclusion

An atypical case is presented aiming to raise awareness in society on the importance for early physiotherapeutic intervention to be included in ALL patients' multidisciplinary treatment in order to improve patient functional area.

Accordingly with the results, the following is recommended: assess the effects of physiotherapeutic interventions for muscle strength increase, the use of the

References

1. Gómez-Almaguer D, Marcos-Ramírez ER, Montañó-Figueroa EH, et al. Acute Leukemia Characteristics are Different Around the World: the Mexican Perspective. *Clin Lymphoma Myeloma Leuk*. 2017;17(1):46-51.
2. Díaz-Ruiz R, Aguilar-López L, Vega-Ruiz A, et al. Análisis de características clínico viológicas de leucemia aguda linfoblástica (LAL) del adulto. *Gac Med Mex*. 2015;151:150-6.
3. Gacha Garay MJ, Akle V, et al. La leucemia linfoblástica aguda y modelos animales alternativos para su estudio en Colombia. *Rev Colomb Cancerol*. 2017.
4. López Chicharro J, Fernández Vaquero A. *Fisiología del ejercicio*. 3^a ed. Ed. Panamericana; 2013.
5. Berger AM, Mooney K, Álvarez-Pérez A, et al. Cancer-Related Fatigue, Version 2.2015. *J Natl Compr Canc Netw*. 2015;13(8):1012-39.