Finding the Missing Pieces: Comprehensive Cerebellar Assessments with Cytarabine Administration

Tara Hinnenkamp
CentraCare Health, tara.hinnenkamp@centracare.com

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**DISCUSSION:**

Patient sign his/her name daily.

Stan (name changed for confidentiality) was a 60 year old male admitted to the hospital with relapsed AML in the is cell. Symptoms include gait and balance disturbances, alterations in fine motor skills, memory loss, peripheral neuropathy and/or seizures. Up to 30% of patients may not regain normal cerebellar function. For those >50 years old, symptoms may persist for more than 30 days. Other risk factors include decreased hepatic and/or renal dysfunction. Within several weeks of ongoing therapy, patient had regained all bowel/bladder function and most function and strength in bilateral upper and lower extremities.

**CASE STUDY:**

Stan (name changed for confidentiality) was a 60 year old male admitted to the hospital with relapsed AML in the is cell. Symptoms include gait and balance disturbances, alterations in fine motor skills, memory loss, peripheral neuropathy and/or seizures. Up to 30% of patients may not regain normal cerebellar function. For those >50 years old, symptoms may persist for more than 30 days. Other risk factors include decreased hepatic and/or renal dysfunction.

**WHAT IS CYTARABINE?**

Cytarabine (Ara-C) is an anti-metabolite chemotherapy agent used to treat acute leukemia and/or refractory non-hodgkin’s lymphoma. The drug is cell-cycle specific and inhibits DNA synthesis thus halting cell division. The dose-limiting toxicity of this drug is NEUROTOXICITY, especially when given in high-dose concentration (Szych & Kaiser, 2015). This is caused by a widespread loss of Purkinje cells in the cerebellum (Lee & Wen, 2015). With high-dose cytarabine administration, there is a high concentration of drug that crosses the blood brain barrier in the cerebral spinal fluid with 50% of the chemotherapy still in the plasma concentration (O’Leary, 2004).

**WHEN IT BECOMES NEUROTOXIC**

- Patient’s receiving high-dose cytarabine have a 7-28% incidence of developing neurotoxicity; high doses include ≥1-3g/m² (Lee & Wen, 2015).
- 10-25% of patient’s develop neurotoxicity when the cumulative dose exceeds 30 grams in a lifetime (Lee & Wen, 2015).
- There is a 60% incidence of cerebellar toxicity recurrrence for patient’s who showed previous toxicity (O’Leary, 2004).
- Other risk factors include decreased hepatic and/or renal dysfunction and/or age >60 years old (Szych & Kaiser, 2015).
- Symptoms usually develop 2-8 days after initial dose and may persist 3-10 days after discontinuation of therapy (O’Leary, 2004).
- For those >50 years old, symptoms may persist for more than 30 days even if therapy is stopped (O’Leary, 2004).
- Up to 30% of patients may not regain normal cerebellar function (O’Leary, 2004).
- Symptoms include gait and balance disturbances, alterations in fine motor skills, memory loss, peripheral neuropathy and/or seizures (Lee & Wen, 2015).

**NURSING CONSIDERATIONS**

A study conducted at the University of Maryland Greenebaum Cancer Center found that one in four nurses felt there were widespread inconsistencies with cerebellar assessments. One of every two nurses felt the current assessment was incomplete and the patient may be suffering as a result (Szych & Kaiser, 2015). There has to be a better way!

**COMPONENTS OF A COMPREHENSIVE ASSESSMENT**

- Nurses need to have the means to accurately and consistently assess both neurologic changes noted with cytarabine administration. The assessment tool must be comprehensive, covering several areas of cerebellum function. Assessments should be completed every shift and/or prior to each dose of cytarabine (Brown & Hall, 2010) (O’Leary, 2004).
- The initial assessment and first dose of High-Dose Cytarabine should be completed during the day time hours to promote patient satisfaction and ensure accuracy of assessment (Szych & Kaiser, 2015).
- The assessment should be relatively short in time (approximately 5-10 minutes or less); especially with the increased demands placed on hospital-based nursing care. Tool should be easy to understand for nurses at all skill levels and integrated into current charting practice (Brown, 2010).
- If the patient fails any aspect of the assessment, the upcoming dose should be held and the oncologist notified immediately. If the patient is to receive medications that may alter gross motor skills, such as narcotics, a cerebellar assessment should be completed prior to administration to ensure accuracy of the assessment (O’Leary, 2004).
- Crucial components of cerebral and cerebellar functional assessments include: (Brown, 2010) (Szych & Kaiser, 2015)
  - Gait and balance: Watch for signs of arhythmia or asymmetry. This is best completed by patient walking heel to toe in straight line.
  - Handwriting: Most often monitored by signing his/her name; preference to utilize a skill that usually doesn’t change over time.
  - Speech Pattern: Have patient state name, date, time, and situation.
  - Body Tremors: Monitor for tremors while standing or walking.
  - Nystagmus: When present, this will cause involuntary rapid eye movement when attempting to focus on an object.
  - Rapid alternating hand movements: Patient will put hands on thighs in rhythmic motion as fast as possible without losing coordination.
  - Romberg Test: Measures three sensory systems in cerebellum to maintain stability, including vision, proprioception and vestibular sense.

**SAMPLES OF ASSESSMENT TOOLS**

- **Nystagmus**: When present, this will cause involuntary rapid eye movement when attempting to focus on an object.

To complete successfully, patient will stand with feet together and eyes closed for 5-10 seconds. (Brown, 2010) (Szych & Kaiser, 2015)

**REFERENCES**


