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Dynamic Medical Consultation on Based on Problem Solving and Decision Making in Craniosynostosis Surgery - ə

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ABSTRACT

The purpose of this paper is to make a protocol to help physicians and surgeons to set a treatment plan up according to their diagnosis and patient`s problems and desires.

In fact it`s physician duty to use his/her ability to identify current and potential health problems of the patient and to make timely decisions for treating.

Treatment when is going to success which:

- Physician understand patient`s desires and problems
- Patient understand aim (goal) of the treatment

So this success in medicine can be possible with a dynamic consultation.

In Dynamic Medical Consultation (DMC) patients can be more active about their own health and health care [1].

In this kind of dialogue physician understand the patient problems and the patient would has better aspect the goal of the treatment. In this way the care pathway and the monitoring of patient`s progress is going to ease and both parties would have better provision in treating process.

A dynamic Medical consultation become important when patient is faced with major treatment plan. Usually most of the patients are under pain or stress situation, taking decision for them become more difficult or sometimes is impossible.

An expert health provider with help of his/her abilities, skills, experiences and knowledge can make the patient`s mind clear about the treatment and care planning. The base of this strategic and holistic communication is obtaining information. In such a way the physician can have a clear view to all dimensions of causes of the problems, treatment plan and outcomes.

The process model for DMC can provide a structure for thinking and reasoning which is helping to identify the need of individual patient.

In DMC the physician can set up the best treatment plan according on his/her diagnosis and personal information which is taken from each patient in person.

In this way not even medical errors can be manageable, patient`s desires and their cooperation comes arise as well.

Keywords: Dynamic Medical Consultation; Share Decision Making; Decision Making; Problem Solving; Craniosynostosis

INTRODUCTION

Dynamic Medical Consultation in Craniosynostosis

A Model For Clinical Practice

Craniosynostosis: Problem Solving (PS) in medicine is a setting up a process to make a diagnosis on base of patient problems and then solving them as a treatment plan and aim of the Decision Making (DM) in medicine is to improve the quality of health and care of each patient individually that are undertaken to achieve specific health treatment and care goals [2,3,4].

The purpose of this paper is show how to set a treatment plan up on based on problem solving and decision making process not even for craniosynostosis surgery but in every treatment plan in medicine and surgery.

Uncorrected craniosynostosis is associated with an increase in intracranial pressure; however, few studies have revealed Increased Intracranial Pressure (ICP) in nonsyndromic single-suture craniosynostosis [5]. Some craniosynostoses` are syndromic and familial. In syndromic craniosynostosis other organs are involved. Patients with single suture craniosynostosis have 4-14 percent rate of developing increased ICP, after surgery to repair the craniosynostosis by cranial vault reconstruction [6,7].

On examination, special attention is paid to the alertness of the infant or child, the head circumference, the pupils, the fontanelles, and the shape and characteristics of the deformity are so important for diagnosis [8].

Craniosynostosis should ideally be managed in a multidisciplinary setting include baseline psychological, speech/language, hearing and orthoptic assessments. Neurosurgical review with ICP monitoring may be required, although this is more commonly used later in childhood to assess symptoms suggestive of raised ICP.

1.1.2. **The Risk of Craniosynostosis Anomaly:** If not treated a child with craniosynostosis can develop further complications as their skull will continue to grow abnormally and this may affect other functions. An example of this is vision loss on the affected side (*amblyopia*). Another risk factor is if the child has a mild case of craniosynostosis, meaning the condition might not be spotted until later. If this is the case, the child may suffer ICP (intercranial pressure) in their skull. This can happen as late as age 8. The symptoms of intercranial pressure include:

- blurry/double vision
- constant headache

The above symptoms do not necessarily mean the child is suffering intercranial pressure but it is definitely worth taking them to the physician to get checked out as ICP can cause much greater problems if left untreated [9,5].

Surgery can perform in two ways: The goal of both surgeries are reconstructive, to allow the brain to grow naturally, and is not intended to be purely cosmetic.

Open craniosynostosis surgery is used for surgical reconstruction of the cranial vault via surgical resection of the closed suture and the creation of osteotomies, bone grafts, and/or use of bio-resorbable plates to reconstruct the vault.

- Advantages

- No need to wear helmet after surgery
- No need for further appointments for weekly helmet check visit

· Limitation

- Long operative time
- Long term hospitalization
- Significant scar
- Not recommended in anemic infants

Minimally invasive endoscopic reconstruction is used to resect the closed suture, and techniques for osteotomies and use of bioresorbable plates have been developed. This procedure does not allow the surgeon to intraoperatively alter the calvarial shape or cephalic index. The patients must wear helmets for 6 to 8 months at least after surgery to help mold the cranium [10].

- Advantages

Decreased operative time (1.5 hour or less)

Usually no need for a blood transfusion, and much decreased blood loose

Shortened hospital stay

Significantly reduced scars

Greatly reduced discomfort and swelling

- Limitations

Have a single fused sagittal, lambdoid, metopic or unilateral coronal suture.

Be 5 months old or younger (After this age the head is not growing as fast, so the helmet is not likely to work as well).

RISKS OF SURGERY

Open Surgery

Extensive Blood Loose Meticulous hemostasis, early transfusion, Tranexemic Acid (TXA), pretreatment patient with erythropoietin)

Hypovolemic Shock

Intraoperative dural Tears

Endoscopic Surgery

Infection in the brain

Bones may connect together again and more surgery is needed

Brain swelling

Damage to brain tissue

DYNAMIC MEDICAL CONSULTATION STAGES

Obtaining Information

Although physicians often have superior knowledge regarding the physiopathology of a patient`s disease and the risk and benefits of specific treatment option among all exist plans, they should try to increase their information regarding personal patient preferences and values to improve the quality of treatment, which also will incorporate the patient`s willingness to pay for a particular treatment intervention and evidence based outcome probabilities. This is not mean that the patient can interfere to treatment plan but this kind of plan can be tremendously helpful for physician to choose between two or more treatment possibilities that which can increase the chance of outcome for each individual patient [Chart 1].

On base of Dynamic Medical Consultation, obtaining information would be in two stages (A & B):

(A) General Information (Physician assessment)

- Data collection (gender, age, knowledge, ethnicity, culture, race,…) , referral source if is exist, medical records
- Date analysis
- Identify causes of anomaly (Genetic, Environmental, Combination of genes and environmental factors or Folic acid deficiency)
- Emphasis the importance of behavioral & psychological readiness for surgery

(B) personal (specific) Information

- Patient desires and values (In this case parents or guardians)
- evaluate patient`s candidacy for surgery with Parents/ Guardians

Diagnosis

Commonly, craniosynostosis is present at birth, but it is not always diagnosed when mild. Usually it is diagnosed as a cranial deformity in the first few months of life [8], Clinical history should include complications of pregnancy, duration of gestation, and birth weight. The history of infant sleeping position is important in differentiating craniosynostosis from plagiocephaly without synostosis. Craniosynostosis can be diagnosed through a combination of physical examination, skull radiographs, 3D head Computed Tomography (CT) scans and molecular and genetic test [6,7,11].

Identify Treatment Objective

The primary goals of treatment in the infants with craniosynostosis are to correct the deformity and allow for adequate brain growth in as safe and effective a manner as possible.

ACQUISITIONS FOR DM

Asses Patient`s Values and Preferences, Identify Treatment Options

Physician Duties

A) Family preparation

- Help the family to understand they have had a long term battle and this is a difficult decision requiring lifelong commitment
- Discuss the benefits of the surgery
- Provide patient education information
- Explain Craniosynostosis surgery
- Craniosynostosis is an adjunct, not an alternative option.
- There may be complications that require subsequent procedures.

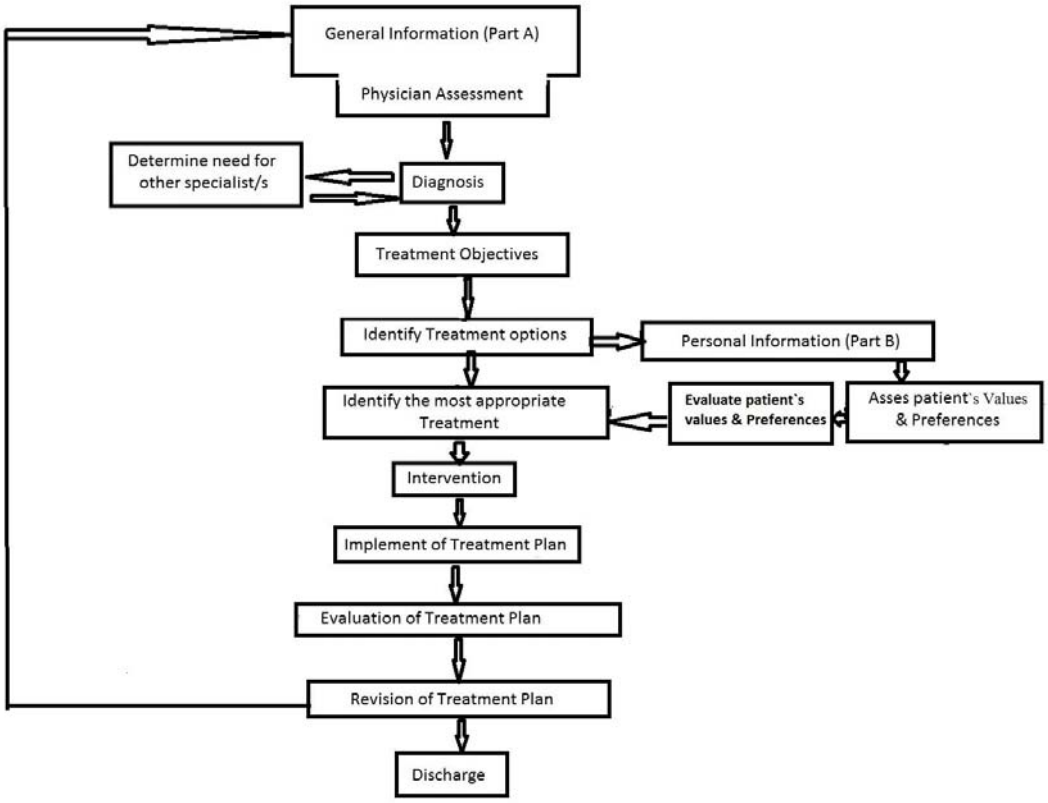

Chart 1:Dynamic Medical Consultaion on based on Problem Solving and Decisiion Making.

- There may be unpleasant side effects over a period of several years
- Insurance

B) Review the risk of craniosynostosis surgery

C) Review the risk of Craniosynostosis anomaly

D) Provide balanced information based on the best medical evidence (statistically)

E) Reinforce the benefits of surgery (statistically)

- Discuss candidacy of baby for craniosynostosis surgery
- Clinical Criteria

F) Emphasize the importance of behavioral and psychological Readiness

G) Determine whether parents:

- Are well informed & highly motivated
- Are supportive
- Do not have untreated severe depression or other mental disorder
- Let patients know they have time for considering treatment plan
- Discuss the option of minimally invasive (Endoscopic) surgery if the patient is candidate.

H) Determine need for other specialist(s) or other services (Behavioral therapist, psychologist, clinical Geneticist, occupational therapist, vocational therapist).

I) Score points for patient`s satisfaction

- Feel good about the treatment plan

Patient Duties

A) Adequate information about the disease (craniosynostosis)

B) Understanding the risks & benefits

C) Recovery from surgery

D) Set realistic Goals and Expectation

E) Understand why the child is candidate for this type of surgery

F) Check insurance coverage

G) Understand post-surgery care

IDENTIFY TREATMENT OPTION

Calvarial Vault Remodeling (Baby is older)

Endoscopic Surgery (Less than 3 months old)

Identify the most appropriate treatment

Identify which one of surgery or treatment plan is sutable for patient

Intervention (during surgery)

- The surgeon made 2 to 3 small cuts (incisions) on the baby's scalp.
- Pieces of abnormal bone were removed.
- The surgeon either reshaped these bone pieces and put them back in, or left the pieces out.

- A plate and some small screws were put in place to help hold the bones in the right position.
- During the latter part of the series, dexamethasone was used for scalp and facial edema, and TXA was used to minimize intraoperative blood loss in some cases, but not in a standardized fashion.

IMPLEMENT TREATMENT PLAN

Some studies showed the negative impact of deformities had not only on the child himself [8], but also on the parents and siblings as well [Gluk 1977].

As we know reconstruction in early childhood believe that normalization of the craniofacial features prior to the patient`s development of a sense of deformity yields optimal psychological benefits [8,11].

The effects of attitudes of parents who have children affected with craniofacial deformities are so important to implementing of plan`s treatment. The effect of surgical reconstruction of the deformity upon these parental attitudes should be consider as well. The parental attitudes can be affected variably and transiently by the events of surgical reconstruction. With all these mentioned reasons parents opinions and desires should be consider in implementing treatment specially when the patient is not eligible to take her or his own decision [8].

EVALUATION OF PATIENT AND EFFECTIVENESS OF THE TREATMENT PLAN

- Post-operative imaging to demonstrate the new arrangement of the bony architecture of the cranial and facial skeleton.
- Radiographs (Reference for further assessment) following the migration of fixation screws, plates and wires
- Using radiographs, CT and in syndromic cases MRI scans, at yearly intervals to evaluate for the development of a hindbrain will be helpful.
- In patient with maxillary hypoplasia, yearly plain radiographs maybe needed to help assess the progress of the deformity when the issue of possible midface advancement is considered.

AFTER SURGERY

Immediate postoperative care is provided by the surgeon, preferably in conjunction with a multidisciplinary team.

Families require education about their child's condition and their role in providing care. They need to prepare themselves and their child for surgery and postsurgical care [12].

- The helmet needs to be worn every day for the first year after surgery.
- It has to be worn at least 23 hours a day. It can be removed during bathing.
- Even if the child is sleeping or playing, the helmet needs to be worn.
- The child should not go to school or daycare for at least 2 to 3 weeks after the surgery.

Measuring the child's head size should be done on each week.

The child will be able to return to normal activities and diet. Make sure the child doesn't bump or hurt the head in any way.

In bed, raise the child's head on a pillow. This will help prevent swelling around the face. Try to get the child to sleep on his or her back.

- Gently turn the baby's head from side to side 4 times per day to help prevent the neck from becoming stiff.
- Swelling from the surgery should go away in about 3 weeks.
- Remind parents to help control the pain, use children's acetaminophen (Tylenol) as doctor advises.
- Keep the child's surgery wound clean and dry until the doctor says to wash it. DO NOT use any lotions, gels, or cream to rinse the child's head until the skin has completely healed. DO NOT soak the wound in water until it heals.

For cleaning the wound:

- Wash the hands before and after
- Use a clean, soft washcloth.
- Dampen the washcloth and use antibacterial soap.
- Clean in a gentle circular motion. Go from one end of the wound to the other.
- Rinse the washcloth well to remove the soap. Then repeat the cleaning motion to rinse the wound.
- Gently pat the wound dry with a clean, dry towel or a washcloth.
- Use a small amount of ointment on the wound as recommended by the doctor.
- For at least 6 months after the sutures are removed, protect the incision from the sun.

Activity

- Keep the baby from activities that put pressure on the incision
- Remove low furniture with sharp edges, to protect the baby from head injuries.
- Feed the baby his or her regular diet.
- Make sure the baby avoids exertion, heat, stress, and fatigue.
- Prevent the baby from picking, scratching, or pulling at the area around the incision. If necessary to, put mittens or socks on his or her hands.

Possible complications

Nevertheless complications are rare after craniofacial surgery. Hypovolemic shock can occur if significant intraoperative blood loss has not been replaced in a timely manner. Blood loss during surgery has been shown to increase with longer operative times, particularly in excess of 5 hours. Additionally, recognized craniofacial syndromes and pansynostosis have also been associated with increased blood loss during surgery [13,14].

Intraoperative dural tears that remain unrecognized can cause postoperative cerebrospinal fluid leaks and resultant infection or subgaleal fluid collections. Epidural or subdural hematoma can occur because of surgical trauma. Almost all patients develop facial

swelling postoperatively, more prominently around the eyes, which rarely causes problems; however, parents and caregivers should be counseled appropriately. Wound infections are generally rare, even after midface procedures, which involve operating in the oral cavity. The frequency rate of these complications is less than 10%. For parents awareness some possible complications has listed below:

- Temperature of 101.5°F (40.5°C): In an infant under 3 months old, a rectal temperature of 100.4°F (38°C) or higher

A fever that lasts more than 24 hours in a child under 2 years of age, or for 3 days in a child older than 2 years.

- vomiting
- fussy or sleepy
- Seems confused, Unusual drowsiness
- Has a head injury, Headache or visual disturbance
- Weakness of arms or legs
- Seizures

If the surgery wound:

- Has pus, blood, or any other drainage coming from it
- Is red, swollen, warm, or more painful.
- Separation of the skin at the incision site
- Drainage, redness, warmth, or swelling at the incision site
- Large collection of fluid under the skin

REVISION OF TREATMENT PLAN

Patients who have had complications or ill effects as a result of primary surgery may require other procedures to correct the original operation which is called revisional surgery.

Make the revisional craniosynostosis surgery is a definitive procedure.

The goal of the revisional Surgery is:

- To correct the problem which is remain unsolved after first or previous surgery.

FOLLOW-UP

Open Surgery

Patients who underwent open procedures were admitted to the pediatric intensive care units overnight with postoperative hemoglobin and hematocrit monitoring to determine whether transfusion was required. Typically blood products were given in the operating room, but postoperative transfusions were performed when a patient was symptomatic or had a hematocrit lower than 21–24%, depending on subgaleal drain outputs and overall status. Patients received antibiotic prophylaxis as long as the subgaleal drain was in place. These patients were evaluated 3 weeks after discharge, and the majority returned for a 1-year follow-up evaluation.

Endoscopic surgery

Patients receiving endoscopic operations were admitted to the neurosurgical ward and also underwent postoperative hemoglobin and hematocrit monitoring. In general, these patients were observed and discharged to home the next day. The threshold for transfusion was a hematocrit of less than 18%. They were fitted for cranial molding helmets in the first week after surgery and received continuing helmet therapy under the supervision of orthotists until 12 months of age. During this time, they typically outgrew one helmet and used two or three total [10].

DISCUSSION

Dynamic Medical Consultation in craniosynostosis surgery can improve the treatment and care plan of the infant.

As mentioned providing information is the most important step for a dynamic and logical choosing treatment plan and that is comes up when physician know what patient knows and whether is correct or not and is the patient already going to take action on it or not.

So style of physician talk, describing of all variants of treatment options and inform the patient why the physician have chosen this particular plan are the keys in clinical practice [15].

A treatment plan is a dynamic and accurate process for each and Individual patient which is essential, because can provide specific type of services, service intensity and progress indicators that are designed for every patient on based on his/her condition, needs and preferences.

Patient come to medical clinics to get proper treatment. Patient`s desire helps physician to take the most accurate and complete option as a treatment plan.

It seems the phrase of Share Decision-Making (SDM) brought many misunderstanding for health care providers and patients as well [16-18]. From one side patients think because the plan of treatment is about his/her health and their body, they should enter to the treatment plan and make force on physician to choose a method according to their requests, on the other hand physicians also according to the rule of SDM! Mostly have lost their independency and confidence and are not able to make an appropriate plan according on their knowledge, experience and diagnosis and almost just want to grant the patient requests and make them satisfied as a customer [19-24].

This method has shown already is with many deficiencies and put the physicians, patients and then the public health in jeopardy and willingly medical errors will be increase.

As the pilot who controls the flight of an air craft by operating its directional flight control to take all passengers to their destination, is an obvious example, in medicine Physician as a helmsman who has rudder of health` ship, is the only responsible one to take the ship to shore[25-28].

Interfering of anything and anyone in navigation and controlling of aircraft or patient in treatment plan can be critically harmful and potentially fatal, or in so optimistic view it decreases the quality of treatment because the patient not even qualified in diagnosis and treatment method, also has no responsibility for those purposes and sharing patient in treatment plan maybe bring more immunity to physician because the responsibility is shared on the patient too but all factors are purely in field of medicine and physician is the only one who can take that responsibility[29].

In Dynamic Medical Consultation the physician can set up the best treatment plan according on his/her diagnosis and personal information which is taken from each patient in person [30].

In this way not even medical errors can be manageable, patient`s desires and their cooperation come arise as well.

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